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(54) OPERATING DEVICE FOR GAME MACHINE, GAME MACHINE BODY, METHOD OF CONTROLLING
OPERATING DEVICE FOR GAME MACHINE AND RECORDING MEDIUM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an operating device for game machine which causes a presence by providing an operating device side for the game machine having a plurality of operation buttons used for a video game machine with a response means to be actuated by a feedback from a game machine body.

SOLUTION: The operating device for game machine which progresses a game by two-way communication means of sending the operation data by the operation of the plurality of operation buttons to the game machine body and properly receiving data from the game machine body is provided with the response means to be actuated by specific response signals from the game machine body. The operating device is provided with an identification code region for assigning the response means and plural control data regions for the response means assigned by these identification codes as dynamic transmission data to be sent to the operating device for the game machine from the game machine body, thereby, the sending of various kinds of the control data to the single or plurality of response means is made possible.

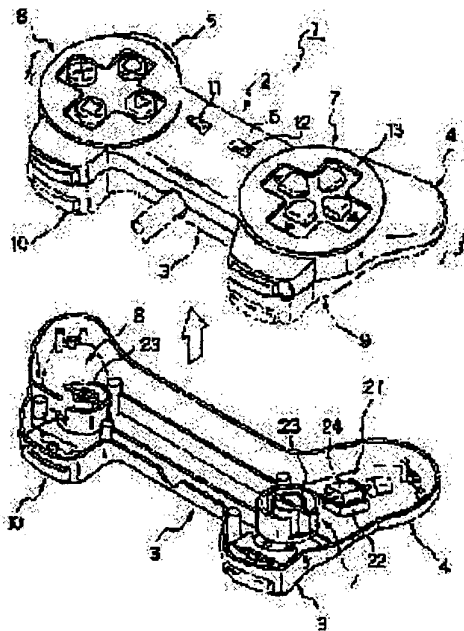


図1 第1の実施形態の概観図

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CLAIMS

[Claim(s)]

[Claim 1] The operating set for game machines equipped with the bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data which a game machine consists of connecting with the main part of a game machine which is characterized by providing the following, and which has the regenerative function of a video record medium, and are inputted from two or more operation buttons and aforementioned operation buttons to the aforementioned main part of a game machine. It is 1st response means to by_ which have a response means answers the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications from the aforementioned main part of a game machine, and operate while being prepared in the position of the aforementioned operating set for game machines itself, and the aforementioned response means answers to the aforementioned specific data, operate so that the response by dynamic transfer may carry out, and, as for the aforementioned response means, the aforementioned dynamic transfer is performed. 2nd response means by which the aforementioned dynamic transfer is made by generating vibration with it. [there is little power consumption and weaker than the 1st response means]

[Claim 2] The operating set for game machines equipped with the bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data which a game machine consists of connecting with the main part of a game machine which is characterized by providing the following, and which has the regenerative function of a video record medium, and are inputted from two or more operation buttons and aforementioned operation buttons to the aforementioned main part of a game machine. While being prepared in the position of the aforementioned operating set for game machines itself, it has a response means to answer the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications from the aforementioned main part of a game machine, and to operate. It is 1st response means by which the aforementioned response means answers the aforementioned specific data, operate so that the response by dynamic transfer may be performed, and the aforementioned dynamic transfer is performed by vibrator going and coming back to the aforementioned response means to a rectilinear, and generating vibration. 2nd response means by which the aforementioned dynamic transfer is made by vibration by rotation of the rotation section which was made to carry out eccentricity to the axis of rotation of a motor, and was attached.

[Claim 3] The operating set for game machines equipped with the bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data which a game machine consists of connecting with the main part of a game machine which is characterized by providing the following, and which has the regenerative function of a video record medium, and are inputted from two or more operation buttons and aforementioned operation buttons to the aforementioned main part of a game machine. It is the 1st response means which it has a response means answers the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications from the aforementioned main part of a game machine, and operate while being prepared in the position of the aforementioned operating set for game machines itself, and the aforementioned response means answers the aforementioned specific data, it operates so that the response by dynamic transfer may be performed, and is a voice coil motor in the aforementioned response means. 2nd response means by which the aforementioned dynamic transfer is made by vibration by rotation of the rotation section which was made to carry out eccentricity to the axis of rotation of a motor, and was attached.

[Claim 4] The operating set for game machines of the claim 1, 2, or 3 publications which are characterized by being prepared in one part other than a part characterized by providing the following. The aforementioned operating set for game machines has the 1st operation supporter for gripping and supporting in the palm, and the 2nd operation supporter, and the aforementioned response means is the operation supporter of the above 1st. The 2nd operation supporter. The center of the side which counters [that each aforementioned operation supporter of the aforementioned

operating set for game machines was formed, and]. It is prepared in the part of ***** and, for the response means of the above 1st, the response means of the above 2nd is a response means of the above 1st among the aforementioned parts to at least one part in the aforementioned part.

[Claim 5] It is the operating set for game machines according to claim 4 characterized by preparing the response means of the above 1st in the operation supporter of the above 1st, and preparing the response means of the above 2nd in the operation supporter of the above 2nd.

[Claim 6] The response means of the above 1st is an operating set for game machines according to claim 1 characterized by arranging one at each shaft orientations of each, respectively.

[Claim 7] the center of the side which counters [that is characterized by providing the following, and], and ** -- the operating set for game machines characterized by being prepared in any two places The operation button of plurality that a game machine consists of [and] connecting with the main part of a game machine which has the regenerative function of a video record medium. Bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data inputted from the aforementioned operation button to the aforementioned main part of a game machine. In the operating set for ***** game machines, while being prepared in the position of the aforementioned operating set for game machines itself It has a response means to answer the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications from the aforementioned main part of a game machine, and to operate. the aforementioned response means The aforementioned specific data are answered, the aforementioned dynamic transfer is made by vibration by rotation of the rotation section which was made to carry out eccentricity to the axis of rotation of a motor, and was attached while operating so that the response by dynamic transfer might be performed, and the aforementioned response means is the operation supporter of the above 1st. The 2nd operation supporter and each aforementioned operation supporter of the aforementioned operating set for game machines.

[Claim 8] The operating set for game machines according to claim 7 to which the oscillating direction of one response means is characterized by being arranged so that the oscillating direction of a X-Z flat surface and the response means of another side may serve as a Y-Z flat surface or a X-Y flat surface among the aforementioned response meanses.

[Claim 9] It is the main part of a game machine to which the operating set for game machines is connected. the aforementioned operating set for game machines The operation data based on operation of two or more operation buttons are sent out to the aforementioned main part of a game machine. And are what advances a game by the bidirectional means of communications which receives suitably the data from the aforementioned main part of a game machine, and the specific data of the aforementioned main part of a game machine are answered. It is the main part of a game machine characterized by the aforementioned main part of a game machine making the response means of the above 2nd generate vibration with it by having the 1st response means and the 2nd response means of performing the response by dynamic transfer. [there is little power consumption and weaker than the response means of the above 1st]

[Claim 10] It is the method which is characterized by providing the following and which is performed in the operating set for game machines. The 1st response means which answers the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications at the aforementioned operating set for game machines at a position from the aforementioned main part of a game machine, and operates, and the 2nd response means which generates vibration with it are established. [there is little power consumption and weaker than this 1st response means] The control method of the operating set for game machines characterized by performing the response by the dynamic transfer which answered the aforementioned specific data with these response meanses. The operation button of plurality that a game machine consists of [and] connecting with the main part of a game machine which has the regenerative function of a video record medium. Bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data inputted from the aforementioned operation button to the aforementioned main part of a game machine.

[Claim 11] The record medium with which the computer program for operating the operating set connected to the computer as an operating set for game machines according to claim 1 to 8 was recorded and in which a computer readout is possible.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Table of Contents] this invention is explained in order of the following.

[0002] The technical field Prior art to which invention belongs (drawing 60)

The gestalt of gestalt (1) the 1st operation of implementation of technical-problem The-means-for-solving-a-technical-problem invention which invention tends to solve (drawing 1 - drawing 13)

(2) The gestalt of the 2nd operation (drawing 14 - drawing 35)

(3) The gestalt of the 3rd operation (drawing 36 - drawing 59)

(4) Gestalt effect-of-the-invention [0003] of other operations

[The technical field to which invention belongs] this invention relates to the operating set for game machines equipped with a means to answer so that presence may be brewed based on the specific signal from the main part of a game machine which has the function which reproduces especially a video record medium about the operating set for game machines which performs a game by operation of two or more operation buttons.

[0004]

[Description of the Prior Art] As the operating set CM for game machines in the conventional technology is shown in drawing 60 , it forms in a glasses configuration, and the housing main part consists of the upper cases 2 and the lower cases 3 which can be divided up and down. In the ends side of the longitudinal direction of this housing main part The 1st and 2nd operation supporters 4 and 5 projected to the corniform gripped and supported in the palm of both hands are formed. The start selection section 6 which consists of a switch used for ***** constriction ***** by a start, selection, etc. of a game in the position of the center of a housing main part, The 1st and 2nd control units 7 and 8 which consist of two or more switch groups which are formed in the right-and-left symmetric position of the both sides of a housing main part at a circle configuration, and are arranged in a part for the abbreviation center section, It consists of the 3rd and 4th control units 9 and 10 which consist of two or more switches which can be operated mainly by the index finger and the middle finger in the bilateral-symmetry position of the side by the side of the side-attachment-wall side of the anterior part of a housing main part.

[0005] The start selection section 6 is equipped with the start switch 11 and the selection switch 12 which are the so-called switch and have been arranged in the mid-position of the 1st control unit 7 and the 2nd control unit 8. The selection switch 12 chooses difficulty etc., when starting a game, and the start switch 11 is a switch which makes a game actually start.

[0006] The 1st control unit 7 has structure which formed the hollow section 13 equivalent to the crevice which made the shape of an abbreviation cross a part for the center section which carried out ***** and the circle configuration at the edge of a housing main part, and the window part 15 for four keytops 14a, 14b, 14c, and 14d projecting in the direction of outside from the interior in this hollow section 13. This window part 15 has the structure where it is arranged at 10 in all character writing directions at the abbreviation cross-like hollow section 13 as the head of four keytops 14a, 14b, 14c, and 14d faces each other.

[0007] As shown in drawing 60 , the 2nd control unit 8 forms the hollow section 16 equivalent to the crevice which made the shape of an abbreviation cross a part for the center section of a circle configuration, and has the structure of having four cylinder parts 17 which have opening of the size which carried out the cross, and which becomes depressed and can project the cylindrical shape-like keytops 16a, 16b, 16c, and 16d in the direction of outside from the interior in each position of the four directions of the section 16, respectively.

[0008] The sign (mark) which expresses functions, such as the recognition sign which is easy to check by looking, for example, O, **, **, and x, to the top face of each four keytops 16a, 16b, 16c, and 16d is attached, and the function of a switch can be easily discriminated now. Moreover, it has structure which prepared a characteristic salient and a

characteristic notch in the lower part side of the these keytops [16a 16b, 16c, and 16d] soffit section and a cylinder part 17 so that it might not go into other cylinder parts 17 at the time of an assembly.

[0009] The opening 18 which the wall surface by the side of the anterior part of the 1st and 2nd control units 7 and 8 is made to project, forms, and consists of a long and slender hole of two trains up and down in parallel with this projected wall surface as the 3rd and 4th control units 9 and 10 are shown in drawing 60 , this opening 18 -- ***** -- it consists of movement directive operation switches which projected and formed from the inside the keytops 19a, 19b, 19c, and 19d which carried out the long and slender configuration in the direction of an outside

[0010] It connects with the main part of a video machine which reproduces CD-ROM which is the video record medium which is not illustrated through a predetermined connector, and the operating set CM for game machines which has such composition is connected to monitors, such as a main part of a video machine, and a television receiver. And it usually has an operating set in the palm of both hands, the operation button group of the 1st - the 4th control unit 7, 8, 9, and 10 is operated with the finger of both hands, it points to the movement of targets of operation, such as a character on monitor display, and a game is performed.

[0011]

[Problem(s) to be Solved by the Invention] However, also in the conventional technology which gave [above-mentioned] explanation, it sets to the operating set CM for home video game machines. By operating the button group of the 1st - the 4th control unit with a finger, point to operation of the target of operation on monitor display, and a game is performed. The operating set itself which looks at the character on monitor display, namely, can feel to a visual sense and the sound generated from a monitor, i.e., an acoustic sense, but moves both hands and an arm variously and operates them Since only the function to operate it with a finger substantially and to direct ** on the other hand is utilized, it does not have a somesthesia function by feedback.

[0012] Therefore, it has the technical problem which must be solved to raise presence as the somesthesia which feeded back from the main part of a game machine is obtained by the operating set itself, and raise a game performance to operation of a button group when specific operation and a scene are therefore encountered.

[0013]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the operating set for game machines concerning this invention established suitably a response means of ***** and the aforementioned operating set drive by the specific reply signal of the aforementioned main part of a game machine in a position, by the operating set which advances a game by the bidirectional means of communications which is connected to the main part of a game machine which has the regenerative function of a video record medium, and sends out the operation data based on operation of two or more operation buttons to the aforementioned main part of a game machine, and receives suitably the data from the aforementioned main part of

[0014] Moreover, it is forming by the vibration by rotation of the rotation section which this response means' was formed in a kind of dynamic transfer, sound, and light, or two sorts or more of combination, was made to carry out eccentricity of the dynamic transfer to the axis of rotation of a motor, and was attached, or vibration of the vibrator therefore driven in a coil.

[0015] Furthermore, various control data can be transmitted to the singular number or two or more response meanses by having two or more identification code fields which specify a response means, and control data fields to the response means therefore specified to be the identification code concerned as dynamic transfer data transmitted to the operating set for game machines from the main part of a game machine.

[0016] By having made it the above-mentioned composition, in addition to the somesthesia by the acoustic sense and the visual sense, the operating set for game machines concerning this invention can obtain the somesthesia in the dynamic transfer by vibration of the operating set itself etc., when the time of carrying out specific operation and a target of operation hit.

[0017]

[Embodiments of the Invention] The gestalt of various operations of the operating set for game machines concerning this invention is explained with reference to a drawing. In addition, since the operating set for game machines concerning this invention is the same as that of the configuration where it explained with the conventional technology, the same sign is given to the same member and the explanation is given so that it may be easy to understand.

[0018] (1) The operating set 1 for game machines of the gestalt of the 1st operation concerning the gestalt this invention of the 1st operation The housing main part equipped with the 1st and 2nd operation supporters 4 and 5 projected to the corniform gripped and supported in the palm of both hands to the ends side of the longitudinal direction formed in the glasses configuration as shown in drawing 1 , The start selection section 6 which the button used for a start, selection, etc. of a game was made to project in the direction of outside to ***** constriction ***** , and formed it in it from the interior in the position of the center of a housing main part, The 1st which made the

crowning of the both sides of the longitudinal direction of a housing main part project a button in the direction of outside from the interior, and 2nd control units 7 and 8, The 3rd and 4th control units 9 and 10 which equipped the wall surface by the side of the front of the longitudinal direction both sides of a housing main part with the button made to project in the direction of outside from the interior, The substrate which contains the switch group with which the interior of the housing main part which is not illustrated is equipped, and CD-ROM which is the video record medium which is not illustrated, and manages communication with the reproducible main part of a game machine, It consists of a connector 20 (refer to drawing 4) equipped with the cable which connects the main part of a game machine electrically, and a response means 21 arranged to the predetermined space inside a housing main part. the inside of this, and drawing 38 -- using -- explanation -- the bottom, the difference with the conventional technology is the point of having established the proper response means 21, and others have the same structure and same composition as the conventional technology

[0019] That is, the housing main part which consisted of an upper case 2 and a lower case 3 has structure which formed the response means arrangement section 22 for equipping with the response means 21 the 1st operation supporter 4 which is the part projected to the corniform in the lower case 3.

[0020] The 1st of the lower case 3 and the 2nd control unit 7 and 8 have structure which prepared the rectangle-like 3rd and the 4th control unit 9 and 10 which formed the installation section 23 of the shape of a cylindrical shape for setting a substrate and a switch group, and were made to project to the front-face side of the 1st and 2nd control units 7 and 8, as shown in drawing 1 .

[0021] In the lower case 3 which consists of such structure, as space which can set the response means 21, as shown in drawing 1 and drawing 4 , the space which exists in the part of the 1st gripped and supported in the palm and 2nd operation supporters 4 and 5 or the narrow anterior position of the start selection section 6 can be used. It has structure which carried out receipt arrangement at the 1st operation supporter 4 gripped in the left palm in the gestalt of this operation.

[0022] Here, the response means 21 has structure which attached the cylindrical shape-like rotation section 26 in the position which shifted namely, carried out eccentricity of the center position to the axis of rotation 25 of a motor 24 and this motor 24, as shown in drawing 2 . In such structure, when a motor 24 carries out a rotation drive, the rotation section 26 is the structure which carries out eccentric rotation and which vibration generates, and this vibration is a kind of dynamic transfer. This vibration is transmitted to the case of the 1st operation supporter 4 lower case 3 and upper case 2 in drawing 1 and drawing 3 , and the whole equipment is coming to vibrate. This condition of generated vibration which carries out eccentricity can be arbitrarily changed by the rotational speed and torque of a motor 24 of the response means 21, and, therefore, can change the strength of a response means to it.

[0023] As shown in drawing 1 , the response means arrangement section 22 prepared in the lower case 3 has structure prepared in the pars basilaris ossis occipitalis of the part which the palm of the 1st operation supporter 4 contacts, and has structure which can fix the motor 24 of the response means 21.

[0024] Thus, by having attached in the part which grips and supports the response means 21 with the 1st operation supporter 4 of the lower case 3, i.e., a left palm As shown in drawing 5 , in case the operating set 1 for game machines and the main part 27 of a game machine are connected to the monitors 33, such as a television receiver, and a game is performed [when a partner is beaten in the kind of game, for example, the game of a sport combative, the mark is hit by the shooting game and a target of operation receives an attack on a screen by airplane] The rotation drive of the motor 24 of the response means 21 can be carried out by the specific reply signal of the main part 27 of a game machine, and fixed time vibration of the operating-set 1 whole for game machines can be carried out. Thus, it can feed back to the user who operating-set 1 the very thing for game machines causes vibration to operation by a user's operation button, and therefore uses for it as somesthesia, and presence can be raised further.

[0025] The CD-ROM driver which has the function which reproduces CD-ROM which is a video record medium here as the main part 27 of a game machine is shown in drawing 5 is built in. The covering device material 28 which contains CD-ROM in the upper surface of the main part 27 of a game machine, and covers it, It has the open/close switch 29 which opens and closes the covering device material 28, the electric power switch 30 which supplies a power supply, the reset switch 31 which makes an initial state operation of the main part 27 of a game machine, and structure which formed the connection 32 which can connect two operating sets. By connecting the connector 20 of the operating set 1 for game machines to this connection 32, two-way communication with the main part 27 of a game machine becomes possible. In addition, the composition which connected one operating set 1 for game machines in the form of this operation explains.

[0026] As described above, in order to make the response means 21 drive and to vibrate the operating-set 1 whole for game machines, it is required between the operating set 1 for game machines, and the main part 27 of a game machine to be the composition equipped with the two-way communication function.

[0027] This two-way communication function can be performed by connecting with the main part 27 of a game machine the connector 20 which performs the operating set 1 for game machines, and bidirectional serial communication, as shown in drawing 6.

[0028] The composition which performs the two-way communication function by the side of the operating set 1 for game machines consists of the main part 27 of a game machine, a serial I/O-interface SIO which performs serial communication, an one-chip microcomputer (this is called microcomputer below) which are parallel I/O interfaces PIO, CPU, RAM, and ROM which input the operation data from two or more operation buttons, and a motor driver 34 which carries out the rotation drive of the motor 24 of the response means 21, and a motor 24 carries out a rotation drive by the supply voltage and the current from the motor driver 34.

[0029] If it has structure which prepared serial I/O-interface SIO which performs serial communication between the operating sets 1 for game machines at the main part 27 side of a game machine and the connector 20 of the operating set 1 for game machines is connected, it connects with serial I/O-interface SIO by the side of the operating set 1 for game machines through this connector 20, and has the composition that bidirectional means of communications, i.e., bidirectional serial communication, can be performed. In addition, the detailed composition of others of the main part 27 of a game machine is omitted.

[0030] The signal line and the control line which perform bidirectional serial communication The signal line TXD (TransmitX' for Data) for data transmission which sends data from the main part 27 of a game machine to the operating set 1 for game machines, The signal line RXD (Received X' for Data) for data transmission which sends data to the main part 27 side of a game machine from the operating-set 1 side for game machines, The signal line SCK (Serial Clock) for serial synchronous clocks which extracts data from the signal lines TXD and RXD for each data transmission, It consists of the control lines DSR (Data Set Ready) for the flow controls for performing the control line DTR for performing establishment, discontinuation, etc. of communication of the operating set 1 for game machines which are a terminal side (Data Terminal Ready), and a lot of data transfer.

[0031] Moreover, as shown in the cable which consists of the signal line and the control line which perform this bidirectional serial communication at drawing 6, the cable 35 for power supplies taken out from the power supply by the side of the main part 27 of a game machine directly other than a signal line and the control line is contained, it connects with the motor driver 34 by the side of the operating set 1 for game machines, and this cable 35 for power supplies supplies the power supply which rotates a motor 24.

[0032] In order that the main part 27 of a game machine shown in drawing 4 may communicate with the operating set 1 for game machines and the bidirectional serial communication procedure which consists of such composition may incorporate the operation data (button information) of the operation button of the 1st - the 4th control unit 7, 8, 9, and 10, the main part 27 of a game machine outputs select data to the control line DTR first. Consequently, the operating set 1 for game machines will check that it has therefore been chosen as the control line DTR, and will be in the receiving waiting state of the signal line TXD following it. Then, the main part 27 of a game machine sends out the identification code which shows the operating set 1 for game machines to the signal line TXD for data transmission. Thereby, the operating set 1 for game machines receives this identification code from a signal line TXD.

[0033] By showing the operating set 1 for game machines, identification code starts communication with the main part 27 of a game machine after this. That is, from the main part 27 of a game machine, control data etc. is transmitted to the operating-set 1 side for game machines through the signal line TXD for data transmission, and the operation data operated with the operation button are conversely transmitted to the main part 27 of a game machine through the signal line RXD for data transmission from the operating set 1 for game machines. Thus, serial communication bidirectional in between the main part 27 of a game machine and the operating sets 1 for game machines is performed, and this communication is ended when the main part 27 of a game machine outputs selection stop data through the control line DTR.

[0034] Thus, if it has bidirectional serial communication facility, while mainly being able to transmit the operation data of an operation button to the main part 27 side of a game machine from the operating-set 1 side for game machines, from the main part 27 side of a game machine, the data for dynamic transfer made to rotate the motor 24 of the response means 21 through the signal line TXD for data transmission can be sent out to the operating-set 1 side for game machines. Therefore, the data for dynamic transfer made to rotate this motor 24 are beforehand set as CD-ROM for games carried in the main part 27 of a game machine, and feedback by dynamic transfer of fixed time is performed to operating-set 1 the very thing for game machines from the main part 27 of a game machine according to the target of the user who performs a game of operation. It explains to the flow chart of drawing 7 and drawing 8 at a below ***** detail, referring to drawing 1 and drawing 6 about this point.

[0035] The main part 27 of a game machine is equipped with specific CD-ROM for games, and the start of a game is set with the start switch 11 of the operating set 1 for game machines shown in drawing 1, and various functions are set

up by operation of the selection switch 12, and it is in the state where a game is performed by operation of the 4th of the 1st - control units 7, 8, 9, and 10.

[0036] And as for the microcomputer which becomes a game start from CPU, RAM, and ROM of the operating set 1 for game machines which were shown in ***** and drawing 6, the data for dynamic transfer of a hit are monitoring continuously whether it has been sent through serial I/O-interface SIO from the main part 27 side of a game machine through serial interface SIO. Time to drive the control signal and motor 24 of the voltage which drives the motor 24 shown in drawing 6, and current is contained in this data for dynamic transfer. And when the data for dynamic transfer are in the data sent from the main part 27 side of a game machine while the game is advancing, the motor driver 34 is made to drive and predetermined-time supply of the voltage currently supplied from the main part 27 of a game machine is carried out at a motor 24. That is, the data for dynamic transfer in the data signal received by the operating-set 1 side for game machines in the step ST 21 of drawing 7 are judged at a step ST 1, it processes with the microcomputer of a step ST 2, the motor driver 34 shown in drawing 6 at a step ST 3 is driven, and vibration is generated at a step ST 4.

[0037] Moreover, if an operation button is operated in a step ST 5 when it is not data for dynamic transfer at a step ST 1, the operation data operated in a step ST 6 will be inputted into a microcomputer through parallel I/O-interface PIO shown in drawing 6.

[0038] The operation data inputted into the microcomputer are processed with a microcomputer in a step ST 2, are changed into serial data in a step ST 7, and are transmitted to the main part 27 of a game machine through serial I/O-interface SIO shown in drawing 6. Then, the operating set 1 for game machines awaits the data from the main part 27 of a game machine in a step ST 25.

[0039] Reception of the operation data from which the main part 27 of a game machine was changed into serial data in the step ST 26 of drawing 8 distinguishes a line intermediary and a hit state for comparison with the data of a target of operation, and the serial data which received in the continuing step ST 8.

[0040] In a step ST 9, when the data and serial data of a target of operation are in agreement (i.e., when it hits) While displaying the target of operation hit in a step ST 10 on the screen of a monitor The data for dynamic transfer are outputted in a step ST 11, and the operating set 1 for game machines is answered as a specific reply signal through serial I/O-interface SIO which changes into serial data in a step ST 12, and is shown in drawing 6. Then, the main part 27 of a game machine awaits the data from the operating set 1 for game machines in a step ST 27. If it is detected by the microcomputer of the operating set 1 for game machines as Steps ST1, ST2, and ST3 explained the dynamic transfer data answered from the main part 27 of a game machine by the operating set 1 for game machines, a motor 34 will be made to supply and rotate a power supply from the motor driver 34 shown in drawing 6, and, therefore, the operating-set 1 whole for game machines will vibrate to the rotation.

[0041] When having not hit, in a step ST 13, the target of operation based on the operation button is displayed on the screen of a monitor, and, therefore, it comes to carry out the next operation to the operation result of the operation button from the operating set 1 for game machines by the step ST 5 (drawing 7).

[0042] Moreover, although the data for dynamic transfer generated when [at which explanation was given / above-mentioned] it hits have composition which the operating set 1 for game machines receives from the main part 27 of a game machine as a specific reply signal, the composition therefore sent out to Mukai's communication on the other hand from the main part 27 of a game machine at the operating set 1 for game machines is sufficient as them.

[0043] Next, the form of other operations of the operating set using the response means by the motor 24 concerning this invention is explained with reference to drawing 9 - drawing 11.

[0044] As the operating set 1 for game machines of the form of this operation is shown in drawing 9 - drawing 11, the part which grips the response means 21 in the palm has pinch-and-swell or deforming structure. The operating set 1 for game machines with the 1st operation supporter 4 gripped and supported in the left palm Namely, ***** It is made to close notching and its notching section for a part of part which a palm contacts. Elastic member 37A, 37B -- attaching -- these elastic members 37A and 37B -- from the interior -- relative -- or -- partial -- extruding -- making -- deformation -- or it carries out pinch-and-swell -- making -- it -- therefore -- a palm -- it has structure to which the somesthesia of the so-called response which gives dynamic transfer inside is made to feed back

[0045] in addition -- as elastic members 37A and 37B -- rubber -- a member or a resin -- a member or cloth -- a member etc. can be used

[0046] Except the attachment structure of the response means 21, since it is substantially the same, the same sign is given and explained to be the form of the 1st operation explaining aforementioned drawing 1, and bidirectional serial communication is also performed by the same technique.

[0047] The response means 21 has structure which equipped with elastic members 37A and 37B as cut and plugged up notching and the lacked portion for a part of part which the palm of the 1st operation supporter 4 of the upper case 2

and the lower case 3 contacts. And as shown in the interior at drawing 10 , it consists of a motor 38 which carries out a rotation drive, and the rotation section 41 of the circle configuration which was attached in the axis of rotation 39 of a motor 38, and was equipped with the salient 40 of plurality [position] suitably of a periphery. Thus, the part which the palm of the 1st operation supporter 4 contacts has a lengthwise short size, and the attached elastic members 37A and 37B have the structure where a lateral size is long, as shown in drawing 11 . Therefore, if the rotation section 41 of a circle configuration rotates, the up position of elastic member 37A of the upper case 2 and the lower position of elastic member 37B of the lower case 3 are pressed, and as the salient 40 of the rotation section 41 extrudes in the direction of an outside, it will rotate in it. As shown in drawing 9 and drawing 11 , in the top and bottom position of a part where the palm of the 1st operation supporter 4 contacts, pinch-and-swell can be carried out, and deformation or the elastic members 37A and 37B by salient 40 can strike this outside, therefore it can make a phenomenon generate vibration, and can raise the presence therefore given to a user to the feel and feedback function by dynamic transfer in a palm. [0048] Furthermore, the form of other operations of the operating set using the response means by the motor 24 concerning this invention is explained with reference to drawing 12 - drawing 13 .

[0049] As this operating set 1 for game machines is shown in drawing 12 and drawing 13 , the response means 21 prepared in the operating set 1 for game machines has deformation or structure which was made to carry out pinch-and-swell. That is, in the 1st operation supporter 4 gripped and supported in the left palm, the operating set 1 for game machines forms the part which a palm contacts by the elastic member 42, and has structure which formed the rotation section 45 of the cam configuration attached in the axis of rotation 44 of a motor 43 and a motor 43 in the interior.

[0050] The rotation section 45 which carried out the cam configuration can obtain presence by also generating vibration and receiving the dynamic transfer as somesthesia in the palm while the portion which the cam projected will strike an elastic member 42 from the inside, or will press it and it will project and deform it outside for it, if a motor 43 carries out a rotation drive.

[0051] (2) Drawing 14 which attaches and shows the same sign to a corresponding point with form drawing 1 of the 2nd operation shows the form of operation of the 2nd of the operating set for game machines by this invention, and the response means 51 is formed in the response means arrangement section 52 formed in the interior of the 1st operation supporter 4 of the lower case 3. This response means 51 has the vibrator 53 to which it goes and comes back to a rectilinear.

[0052] That is, as shown in drawing 15 , therefore, the response means 51 of the form of the 2nd operation forms a stator 54 in the two magnetic substance 55 and 56 which makes the both-way vibration of this vibrator 53 carry out in the direction of an axis of the coil bobbin 57 while forming vibrator 53 in the thing of the cylindrical shape-like coil bobbin 57 for which weight 63 is mostly fixed in the center therefore.

[0053] In the ends of a coil bobbin, an electric conduction line is wound around an opposite direction, respectively, and the 1st coil 58 and the 2nd coil 59 are formed. thus, loosely fitting in which the coil bobbin 57 with which coils 58 and 59 were formed in right-and-left ends was drilled by the magnetic substance 55 and 56 in the both ends, respectively -- it fits loosely into Holes 55E and 56E (drawing 15), and is held at the state where it may therefore move reciprocally in the hanging section 60 which consists of supporter material 61 and flat spring 62

[0054] Drawing 16 shows the cross section of the response means 51, the two magnetic substance 55 and 56 which forms a stator 54 makes a sheathing configuration the shape of a cylindrical shape mostly, respectively, and the ***** cylindrical shape-like magnetic pole sections (south pole) 55A and 56A protrude on the medial-axis line. Therefore, it connects with the magnetic substance 55 and 56 carrying out insertion fixation of the iron core 64 between [of these two] magnetic pole section 55A and 56A. the member which incidentally connects the magnetic substance 55 and 56 - the resin of not only the iron core 64 but non-magnetic material -- a member is sufficient

[0055] Moreover, the magnetic pole sections (N pole) 55B and 56B which protruded in a circle are formed in the position which separated the predetermined gap on each circumferential side of the magnetic pole sections 55A and 56A, and countered it. Therefore, in the magnetic substance 55, flux density B exists in the gap between magnetic pole section 55A and magnetic pole section 55B (loosely fitting hole 55E), and flux density B exists in the gap between magnetic pole section 56A and magnetic pole section 56B (loosely fitting hole 56E) in the magnetic substance 56. loosely fitting of the magnetic substance 55 -- one edge of the coil bobbin 57 which forms vibrator 53 fits loosely into hole 55E, and it is arranged so that the coil 58 wound around this edge may cross magnetic flux moreover, the magnetic substance 56 -- also setting -- the same -- carrying out -- loosely fitting -- the other-end section of the coil bobbin 57 fits loosely into hole 56E, and it is arranged so that the coil 59 wound around this edge may cross magnetic flux

[0056] The state where it moved leftward the edge in which the coil 58 of vibrator 53 was formed here as shown in drawing 17 (A) contacts the magnetic substance 55 is made into an initial state. While adding drive current I58 as shown in drawing 18 (A) to a coil 58 If drive current I59 as shown in drawing 18 (B) to a coil 59 is added, in an initial

state (time $t=0$), drive current I58 flows in a coil 58, and it will be in the state where drive current I59 does not flow in a coil 59.

[0057] Thereby, when force $F=I58 \times B$ joins a coil 58, vibrator 53 moves rightward (namely, direction which faces to the magnetic substance 56), and the edge in which the coil 59 of vibrator 53 was formed as shown in drawing 17 (B) suspends it in the position which contacts the magnetic substance 56.

[0058] And at the time $t=T$ and ***** time, as shown in drawing 18 (B), drive current I59 flows in a coil 59, and it will be in the state where drive current I58 does not flow in a coil 58, as [show / in drawing 18 (A)]. Therefore, when the winding direction of coils 58 and 59 is an opposite direction, the force $-F$ Weak joins a coil 59. Consequently, vibrator 53 moves leftward (namely, direction which faces to the magnetic substance 55), and returns to the initial state shown in drawing 17 (A).

[0059] Vibrator 53 will move reciprocally namely, vibrate among the magnetic substance 55 and 56 by energizing hereafter the drive current I58 and I59 added to coils 58 and 59 by turns similarly.

[0060] Incidentally, if the period of drive current I58 and I59 is changed, the oscillation frequency of vibrator 53 can be changed, and if the current value of drive current I58 and I59 is changed, the force F (namely, acceleration) of joining vibrator 53 can be changed. In addition, if the magnetic substance 55 and 56 is enlarged, flux density B will become large, and the force F of joining vibrator 53 can be enlarged. In this case, by making the magnetic substance 55 and 56 into a stator 54, compared with the case where the magnetic substance 55 and 56 concerned is formed in a vibrator side, even if it enlarges the magnetic substance 55 and 56, the mass by the side of vibrator cannot change only by the mass by the side of a stator increasing, but vibration sufficient thereby practically can be generated.

[0061] If drive current I58 and I59 (let these be drive current I collectively hereafter) is added to coils 58 and 59 and vibrator 53 is vibrated in this way, this vibration will be transmitted to the 1st operation supporter 4 through the response means arrangement section 52 which fixed the stator 54 to the lower case 2 (drawing 14) (drawing 19). Vibration transmitted to the 1st operation supporter 4 is transmitted to the case of the 1st operation supporter 4 lower case 3 and upper case 2 concerned, and the whole equipment comes to vibrate. Therefore the condition of vibration therefore generated in this vibrator 53 can change at arbitration the drive current I added to the coils 58 and 59 of the response means 51, and, therefore, can change the strength of vibration of the response means 51 to it.

[0062] Incidentally, as space which can set the response means 51, as shown in drawing 14 and drawing 20 , the space which exists in the part of the 1st gripped and supported in the palm and 2nd operation supporters 4 and 5 or the anterior position of the start selection section 6 inserted into two control units 7 and 8 can be used. It has structure which carried out receipt arrangement at the 1st operation supporter 4 gripped in the left palm in the form of this operation.

[0063] Thus, by having attached in the part which grips and supports the response means 51 with the 1st operation supporter 4 of the lower case 3, i.e., a left palm As shown in drawing 21 , in case the operating set 50 for game machines and the main part 27 of a game machine are connected to the monitors 33, such as a television receiver, and a game is performed [when a partner is beaten in the kind of game, for example, the game of a sport combative, the mark is hit by the shooting game and a target of operation receives an attack on a screen by airplane] The vibrator 53 of the response means 51 can be vibrated by the specific reply signal of the main part 27 of a game machine, and fixed time vibration of the operating-set 50 whole for game machines can be carried out. Thus, it can feed back to the user who operating-set 50 the very thing causes vibration to operation by a user's operation button, and therefore uses for it as somesthesis, and presence can be raised further.

[0064] The CD-ROM driver which has the function which reproduces CD-ROM which is a video record medium here as the main part 27 of a game machine is shown in drawing 21 is built in. The covering device material 28 which contains CD-ROM in the upper surface of the main part 27 of a game machine, and covers it, It has the open/close switch 29 which opens and closes the covering device material 28, the electric power switch 30 which supplies a power supply, the reset switch 31 which makes an initial state operation of the main part 27 of a game machine, and structure which formed the connection 32 which can connect two operating sets. By connecting the connector 20 of the operating set 50 for game machines to this connection 32, two-way communication with the main part 27 of a game machine becomes possible. In addition, the composition which connected one operating set 50 for game machines in the form of this operation explains.

[0065] As described above, in order to make the response means 51 drive and to vibrate the operating-set 50 whole for game machines, it is required between the operating set 50 for game machines, and the main part 27 of a game machine to be the composition equipped with the two-way communication function. This two-way communication function can be performed by connecting with the main part 27 of a game machine the connector 20 which performs the operating set 50 for game machines, and bidirectional serial communication, as shown in drawing 22 .

[0066] The composition which performs the two-way communication function by the side of the operating set 50 for

game machines consists of the main part 27 of a game machine, an I/O-interface SIO which performs serial communication, an one-chip microcomputer (this is called microcomputer below) which are parallel I/O interfaces PIO, CPU, RAM, and ROM which input the operation data from two or more operation buttons, and a coil driver 64 which vibrates the vibrator 53 of the response means 51, and the coils 58 and 59 of vibrator 53 vibrate by the supply voltage and current from the coil driver 64.

[0067] If it has structure which prepared serial I/O-interface SIO which performs serial communication between the operating sets 50 for game machines at the main part 27 side of a game machine and the connector 20 of the operating set 50 for game machines is connected, it connects with serial I/O-interface SIO by the side of the operating set 50 for game machines through this connector 20, and has the composition that bidirectional means of communications, i.e., bidirectional serial communication, can be performed. In addition, the detailed composition of others of the main part 27 of a game machine is omitted.

[0068] The signal line and the control line which perform bidirectional serial communication signal line TXD (Transmit X'for Data) for data transmission which sends data from the main part 27 of a game machine to the operating set 50 for game machines signal line RDX for data transmission (Received X'for Data) which sends data to the main part 27 side of a game machine from the operating-set 50 side for game machines The signal line SCK (Serial Clock) for serial synchronous clocks which extracts data from the signal lines TXD and RXD for each data transmission, the control line DTR for performing establishment, discontinuation, etc. of communication of the operating set 50 for game machines which are a terminal side (Data Terminal Ready) It consists of the control lines DSR for the flow controls for performing a lot of data transfer (Data Set Ready).

[0069] Moreover, as shown in the cable which consists of the signal line and the control line which perform this bidirectional serial communication at drawing 21 , the cable 35 for power supplies taken out from the power supply by the side of the main part 27 of a game machine directly other than a signal line and the control line is contained, it connects with the coil driver 64 by the side of the operating set 50 for game machines, and this cable 35 for power supplies supplies the power supply which vibrates vibrator 53.

[0070] First, it will check that the main part 27 of a game machine has therefore been chosen as the control line DTR, and the bidirectional serial communication procedure which consists of such composition will be in the receiving waiting state of the signal line TXD following it, in order for the main part 27 of a game machine shown in drawing 22 to communicate with the operating set 50 for game machines and to incorporate the operation data (button information) of the operation button of the 1st - the 4th control unit 7, 8, 9, and 10. Then, the main part 27 of a game machine sends out the identification code which shows the operating set 50 for game machines to the signal line TXD for data transmission. Thereby, the operating set 50 for game machines receives this identification code from a signal line TXD. By showing the operating set 50 for game machines, identification code starts communication with the main part 27 of a game machine after this. That is, from the main part 27 of a game machine, control data etc. is transmitted to the operating-set 50 side for game machines through the signal line TXD for data transmission, and the operation data operated with the operation button are conversely transmitted to the main part 27 of a game machine through the signal line RXD for data transmission from the operating set 50 for game machines. Thus, serial communication bidirectional in between the main part 27 of a game machine and the operating sets 50 for game machines is performed, and this communication is ended when the main part 27 of a game machine outputs selection stop data through the control line DTR.

[0071] Thus, if it has bidirectional serial communication facility, while mainly being able to transmit the operation data of an operation button to the main part 27 side of a game machine from the operating-set 50 side for game machines, from the main part 27 side of a game machine, the data for dynamic transfer which vibrate the vibrator 53 of the response means 51 through the signal line TXD for data transmission can be sent out to the operating-set 50 side for game machines. Therefore, the data for dynamic transfer which vibrate this vibrator 53 are beforehand set as CD-ROM for games carried in the main part 27 of a game machine, and feedback by dynamic transfer of fixed time is performed to operating-set 50 the very thing for game machines from the main part 27 of a game machine according to the target of the user who performs a game of operation. It explains to the flow chart of drawing 23 which attaches and shows the same sign to a corresponding point with drawing 7 and drawing 8 , and drawing 24 at a below ***** detail, referring to drawing 14 and drawing 22 about this point.

[0072] The main part 27 of a game machine is equipped with specific CD-ROM for games, and the start of a game is set with the start switch 11 of the operating set 50 for game machines shown in drawing 14 , and various functions are set up by operation of the selection switch 12, and it is in the state where a game is performed by operation of the 4th of the 1st - control units 7, 8, 9, and 10.

[0073] And the microcomputer which becomes a game start from CPU, RAM, and ROM of the operating set 50 for game machines which were shown in ***** and drawing 22 is continuously monitored in the step ST 21 which shows

drawing 23 whether the data for dynamic transfer of a hit have been sent through serial I/O-interface SIO through serial interface SIO from the main part 27 side of a game machine. Time to drive the control signal and vibrator 53 of the voltage which drives the vibrator 53 shown in drawing 22 , and current is contained in this data for dynamic transfer. And when the data for dynamic transfer are in the data sent from the main part 27 side of a game machine while the game is advancing, the coil driver 64 is made to drive and predetermined-time supply of the voltage and current which are supplied from the main part 27 of a game machine is carried out at the coils 58 and 59 of vibrator 53.

[0074] That is, after judging the data for dynamic transfer in the data signal received by the operating-set 50 side for game machines at a step ST 1, microcomputer processing is carried out in a step ST 2. The data for dynamic transfer obtained as a result are changed into an analog signal in a step ST 22, and, therefore, the coil driver 64 (drawing 22) is driven to the analog signal concerned in the continuing step ST 23. By supplying drive current I to the coils 58 and 59 of vibrator 53 from the coil driver 64 in this way, vibrator 53 vibrates in a step ST 24.

[0075] Moreover, when the data signal supplied to the operating set 50 for game machines from the main part 27 of a game machine is not data for dynamic transfer, the microcomputer of the operating set 50 for game machines awaits the state where a ***** operation button is operated by the step ST 5 from the step ST 1 of drawing 23 . If an affirmation result is obtained here, this will mean that the operation button of the operating set 50 for game machines was operated, and a microcomputer will incorporate ***** and operation data through parallel I/O-interface PIO to a step ST 6 at this time.

[0076] The operation data inputted into the microcomputer are processed in the step ST 2 of drawing 23 , are changed into serial data in a step ST 7, and are transmitted to the main part 27 of a game machine through serial I/O-interface SIO (drawing 22). Then, the operating set 50 for game machines will be in the state of awaiting the data from the main part 27 of a game machine in a step ST 25.

[0077] The main part 27 of a game machine receives the data from the operating set 50 for game machines in the step ST 26 shown in drawing 24 , and distinguishes a hit state for comparison with the data of a target of operation, and the serial data which received in a line intermediary and a step ST 9 in the continuing step ST 8.

[0078] When the data of a target of operation and the serial data which received are in agreement here (i.e., when it hits) While displaying the target of operation which carried out the ***** hit on a step ST 10 on the screen of a monitor from a step ST 9 The data for dynamic transfer are outputted in a step ST 11, it changes into serial data in a step ST 12, and the operating set 50 for game machines is answered as a specific reply signal through serial I/O-interface SIO (drawing 22). If it is detected by the microcomputer of the operating set 50 for game machines as the step ST 1, the step ST 2, and Step ST 3 of drawing 23 explained this data for dynamic transfer, a power supply will be supplied to the coils 58 and 59 of vibrator 53 from the coil driver 64 (drawing 22), this will be vibrated, and, therefore, the operating-set 50 whole for game machines will vibrate to the vibration.

[0079] On the other hand, if a negative result is obtained in a step ST 9 (drawing 24) The data of a target of operation and the serial data of this from the operating set 50 for game machines do not correspond, namely, the thing which has not been hit -- expressing -- ***** -- this time -- CPU (Central Processing Unit) of the main part 27 of a game machine After displaying the target of operation based on the ***** operation button on a step ST 13 on the screen of a monitor, the data from the operating set 50 for ***** game machines are awaited to a step ST 27.

[0080] Incidentally, although the data for dynamic transfer generated when [at which explanation was given / above-mentioned] it hits have composition which the operating set 50 for game machines receives from the main part 27 of a game machine as a specific reply signal, the composition therefore sent out to Mukai's communication on the other hand from the main part 27 of a game machine at the operating set 50 for game machines is sufficient as them.

[0081] Drawing 25 (A) shows the packet data PA for driving especially the coils 58 and 59 of vibrator 53 among the data for dynamic transfer transmitted to the operating set 50 for game machines from the main part 27 of a game machine, and, in the case of the gestalt of this operation, therefore, one packet is constituted by four current-value data here. As for each microcomputer of the main part 27 of a game machine, and the operating set 50 for game machines, data processing is performed by every 1 / 60 seconds (one frame), and the packet data PA are transmitted to the operating set 50 for game machines every [1/] 60 seconds from the main part 27 of a game machine according to this.

[0082] Therefore, four current-value data in 1 packet By distributing within a 1/4-frame period [every] one-frame period, the drive current value which adds only the number of the current-value data in a packet to the coils 58 and 59 of vibrator 53 in an one-frame period can be changed.

[0083] That is, therefore, data processing of the data for dynamic transfer transmitted to the operating set 50 for game machines from the main part 27 of a game machine in a certain one-frame period is carried out to the microcomputer of the operating set 50 for game machines concerned, and the packet data PA are read. In the case of drawing 25 (A), four current-value data "2", "3", "5", and "3" are read as packet data PA, and after these current-value data are changed into an analog signal, they are sent out to the coil driver 64 mentioned above about drawing 21 .

[0084] The coil driver 64 obtains the drive current signal SD therefore shown in therefore carrying out analog amplification at drawing 25 (B) to the power supply to which the current value changed into the analog signal is supplied from the main part 27 of a game machine. This drive current signal SD The current-value data of the packet data PA "2", In the 1st frame period floor line 1 (time t11-t15) which corresponds to "3", "5", and "3", and is supplied to coils 58 and 59 from the coil driver 64 It begins. In a 1/4-frame period (time t11-t12), it becomes the current value corresponding to the 1st current-value data "2." The start concerned A 1/4-frame period is followed. In a 1/4-frame period (time t12-t13), it becomes the current value corresponding to the 2nd current-value data "3." furthermore, this is followed the current value corresponding to the 3rd current-value data "5" at the 1/4-frame period (time t13-t14) -- becoming -- the last In a 1/4-frame period (time t14-t15), it becomes the current value corresponding to the 4th current-value data "3."

[0085] Thus, by *****'s also storing the current-value data of plurality (in the case of the form of this operation four) in the packet of the data for dynamic transfer concerned whole 1 / 60 seconds, and transmitting from the main part 27 of a game machine, the data transfer timing for dynamic transfer transmitted to the operating set 50 for game machines can distribute two or more current-value data concerned to an one-frame period in the operating set 50 for game machines, and can consider as the drive current signal SD.

[0086] Consequently, therefore, vibrator 53 is driven to the drive current signal SD which changes by the time interval finer than the time interval (one-frame period) to which the data for dynamic transfer are transmitted. Thus, while being able to set the frequency of vibrator 53 as the number of the current-value data assigned in a packet by changing the wave of the drive current signal SD arbitrarily by the fine time interval and various current-value data therefore, therefore, the acceleration of vibrator 53 can be set as current value.

[0087] Incidentally, various values are set up according to the degree of the shock with which the current-value data set as the packet data PA join the operation-on advance target of a game in the main part 27 of a game machine. In this case, the number of various [in addition to four] also in the number of the current-value data assigned in 1 packet is assigned. Therefore, in being the scene on which big impulse force joins for example, a target of operation by setting up various drive current wave types according to the advance situation of a game, when big current value joins [a short time] coils 58 and 59 by turns, a big vibration like a shock occurs in the operating set 50 for game machines. On the other hand, in being the scene which vibration which followed the target of operation small, for example like the idling of an automobile generates, when small current value joins coils 58 and 59 by turns for a long time, vibration just like the idling of an automobile occurs in the operating set 50 for game machines.

[0088] By using a response means 51 to have vibrator 53, in this way, when vibration produced at the target of imagination of operation and the same vibration arise in the operating set 50 for game machines according to the advance situation of the game unfolded on the screen of a monitor, the user who operates the operating set 50 for game machines concerned can experience a game with presence.

[0089] In addition, as shown in drawing 26 which attaches and shows the same sign to a corresponding point not only with this but drawing 16 , you may make it this invention vibrate vibrator 74 therefore to the one magnetic substance 71 in the form of the 2nd operation of a ****, although the case where between the two magnetic substance 55 and 56 was made for vibrator 53 to move reciprocally was described.

[0090] in this case, loosely fitting which vibrator 74 forms a coil 73 only in one edge of the cylindrical shape-like coil bobbin 72, and is formed in this coil 73 between magnetic pole section 71A of the magnetic substance 71, and 71B -- a hole -- it is made to fit loosely into 71E the case where the coil bobbin 72 moves most rightward (namely, direction which faces to the magnetic substance 71) in the formation field of the coil 73 formed in the coil bobbin 72 at this time, and the case where it moves most leftward (namely, direction which separates from the magnetic substance 71) -- respectively -- alike -- setting -- any -- loosely fitting -- a hole -- it is set up so that a coil 73 may exist in the position which crosses the magnetic flux in 71E

[0091] Thus, by making it the composition which therefore vibrates vibrator 74 to the one magnetic substance 71, the size can be made small as the response means 70 whole.

[0092] Moreover, although the case where the coil bobbin 57 in which coils 58 and 59 (drawing 15 and drawing 16) were formed was vibrated as vibrator 53 in the form of the 2nd operation of a **** was described As shown in drawing 27 and drawing 28 which attach and show the same sign to a corresponding point not only with this but drawing 15 and drawing 16 , this invention makes coils 58 and 59 a stator, and you may make it vibrate the magnetic substance 81 and 82 as vibrator.

[0093] namely, drawing 27 -- setting -- the response means 75 -- the upper case 2 of the operating set for game machines -- and -- or the coil bobbins 77A and 77B are fixed to the supporter material 76A and 76B fixed to the lower case 3 Coils 58 and 59 wind an electric conduction line around a retrose mutually, and are formed in these coil bobbins 77A and 77B.

[0094] As a cross section is shown in drawing 28, the magnetic substance 81 and 82 has the magnetic pole sections 81A and 82A of the shape of a cylindrical shape which protruded on the core, respectively, and has the magnetic pole sections 81B and 82B in a circle in the position which separates a predetermined gap on the circumferential side of the magnetic pole sections 81A and 82A, and counters it.

[0095] loosely fitting in which the magnetic substance 81 is formed between magnetic pole section 81A and 81B -- a hole -- loosely fitting in which it is held so that a coil 58 may be fitted loosely into 81E, and the magnetic substance 82 is formed between magnetic pole section 82A and 82B -- a hole -- it is held so that a coil 59 may be fitted loosely into 82E. Moreover, at the tooth back, it is fixed to one and, therefore, the magnetic substance 81 and 82 of each other is held free [movement right and left] at the hanging section 60.

[0096] By adding drive current to coils 58 and 59 by turns like the case where it mentions above, about drawing 18 in this way, the unified magnetic substance 81 and 82 can be vibrated, and vibration of the magnetic substance 81 and 82 concerned is transmitted to the whole operating set for game machines through the supporter material 76A and 76B.

[0097] Moreover, as shown not only in this but in drawing 29, this invention makes a coil 88 a stator and you may make it vibrate the magnetic substance 90 as vibrator in the gestalt of the 2nd operation of a ****, although the case where the coil bobbin 57 in which coils 58 and 59 (drawing 15 and drawing 16) were formed was vibrated as vibrator 53 was described.

[0098] namely, drawing 29 -- setting -- the response means 85 -- the upper case 2 of the operating set for game machines -- and -- or the coil bobbin 87 is fixed between supporter material 86A fixed to the lower case 3, and 86B, an electric conduction line is wound around the coil bobbin 87 concerned, and the coil 88 is formed

[0099] A predetermined gap is separated to this coil 88, the magnetic substance 90 in a circle fits in loosely, and, therefore, it is held free [vibration] to the opposite direction with the direction of arrow a, and this at the spring 89. Therefore in the state where drive current is not added to a coil 88, the magnetic substance 90 is held near the simultaneously center of a coil 88 at a spring 89.

[0100] As this state is shown in drawing 30 (A), by adding drive current I in the predetermined direction of a coil 88, a magnetic field with a coil 88 is formed and the force F which moves in drawing 30 (A) rightward (direction which goes to supporter material 86B) joins the magnetic substance 90. Consequently, the magnetic substance 90 moves to the supporter material 86B side.

[0101] On the other hand, if the sense of the current added to a coil 88 is switched to a retrose, as shown in drawing 30 (B), with the case of drawing 30 (A), force-F of a retrose will join the magnetic substance 90. Consequently, the magnetic substance 90 moves to the supporter material 86A side. Thus, the magnetic substance 90 can be vibrated right and left by switching the sense of the current added to a coil 88.

[0102] Vibration of the magnetic substance 90 concerned is transmitted to the whole operating set for game machines through the supporter material 86A and 86B in this way.

[0103] Moreover, although the case where the operating set 50 for game machines was therefore constituted was stated to the upper case 2 and the lower case 3 which become by rigid resin, therefore this invention forms not only this but some of the upper cases 2 concerned and the lower cases 3 in an elastic member, and you may make it vibrate the elastic member concerned therefore to the above-mentioned response meanses 51, 70, and 75 or 85 in the form of the 2nd operation of a ****.

[0104] Namely, drawing 31 which attaches and shows the same sign to a corresponding point with drawing 9 In the 1st operation supporter 4 which it is made to vibrate the response means 75 therefore, and grips and supports the elastic members 37A and 37B prepared in some of upper cases 2 and lower cases 3, respectively in the left palm As notching and its notching section are closed for a part of part which a palm contacts, elastic members 37A and 37B are attached. these elastic members 37A and 37B -- from the interior -- relative -- or -- partial -- extruding -- making -- deformation - - or it carries out pinch-and-swell -- making -- it -- therefore -- a palm -- it has structure to which the somesthesia of the so-called response which gives dynamic transfer inside is made to feed back

[0105] in addition -- as elastic members 37A and 37B -- for example, a rubber member and a resin -- a member or cloth -- a member etc. can be used

[0106] The response means 75 has structure which equipped with elastic members 37A and 37B as cut and plugged up notching and the lacked portion for a part of part which the palm of the 1st operation supporter 4 of the upper case 2 and the lower case 3 contacts. And as shown in the interior at drawing 32 and drawing 33, therefore, the response means 75 is held in the direction which may move the vibrator (magnetic substance 81 and 82) up and down at the hanging section 60.

[0107] In this case, the coil 58 of the response means 75 is fixed to elastic member 37B of the lower case 3 with the coil bobbin 77A (drawing 28), and the coil 59 is being fixed to elastic member 37A of the upper case 2 with the coil bobbin 77B (drawing 28). Moreover, magnetic pole section 81A (drawing 33) of the shape of a cylindrical shape of

the magnetic substance 81 Elastic member 37B of the lower case 3 is contacted through the interior of pillar-like coil bobbin 77A (drawing 28) in which the coil 58 was formed. Magnetic pole section 82A (drawing 32 and drawing 33) of the shape of a cylindrical shape of the magnetic substance 82 is in contact with elastic member 37A of the upper case 2 through the interior of pillar-like coil bobbin 77B (drawing 28) in which the coil 59 was formed.

[0108] In this state, by adding drive current to coils 58 and 59 by turns, vibrator (magnetic substance 81 and 82) vibrates in the vertical direction, and, therefore, elastic members 37B and 37A carry out pinch-and-swell to each magnetic pole sections 81A and 82A. Consequently, in the top and bottom position of a part where the palm of the 1st operation supporter 4 contacts, elastic members 37A and 37B can raise outside the presence therefore given to a user to the feel and feedback function by dynamic transfer in a palm deformation or by carrying out pinch-and-swell.

[0109] Moreover, although the case where the operating set 50 for game machines was therefore constituted was stated to the upper case 2 and the lower case 3 which become by rigid resin in the form of the 2nd operation of a ****

Therefore this invention forms in an elastic member the part which a palm contacts, and you may make it vibrate the elastic member concerned therefore to the above-mentioned response meanses 51, 70, and 75 or 85 in the 1st operation supporter 4 which not only this but a user grips and supports in the left palm. That is, it is made for drawing 34 and drawing 35 which attached and show the same sign to a corresponding point with drawing 12 and drawing 13 to vibrate the elastic member 42 prepared in a part of operation supporter 4 therefore for the response means 75, and, therefore, the response means 75 is held to the interior at the hanging section 60.

[0110] In drawing 35 , supporter material 76A is fixed to the upper case 2 or the lower case 3, and coil bobbin 77B (drawing 28) which formed the coil 59 in the supporter material concerned with the hanging section 60 is being fixed. Moreover, coil bobbin 77A (drawing 28) in which the coil 58 was formed was fixed to the inside side of an elastic member 42, and magnetic pole section 81A of the magnetic substance 81 has contacted through the interior of the coil bobbin 77A concerned.

[0111] therefore, the thing for which drive current is added to coils 58 and 59 by turns -- the magnetic substance 81 and 82 -- the direction of arrow a, and this -- an opposite direction -- vibrating -- consequently, magnetic pole section 81A of the magnetic substance 81 -- an elastic member 42 -- an outside -- deformation -- or it carries out pinch-and-swell A user's presence can be raised by transmitting the dynamic transfer as somesthesia to a user through the palm which contacts an elastic member 42 in this way.

[0112] Moreover, in the gestalt of the 2nd operation of a ****, although the case where vibrator was vibrated linearly was described, this invention may use not only for this but for a predetermined curve the oscillating method which carries out ***** reciprocating movement.

[0113] Moreover, in the gestalt of the 2nd operation of a ****, although the case where vibrator was therefore hung to flat spring 62 was described, this invention can use other various hanging meanses, such as not only this but coiled spring. In this case, you may make it the number of hanging meanses hang vibrator from two or more places not only using one but using two or more hanging meanses.

[0114] Moreover, although the case where the current value in each timing of the drive current added to each coil of the response means 51 (70, 75, 85) was transmitted to the operating set 50 for game machines by packet data from the main part 27 of a game machine in the form of the 2nd operation of a **** was described this invention transmits the data not only showing this but the configuration of drive current wave type to the operating set 50 for game machines from the main part 27 of a game machine, and you may make it generate the current wave form according to the data point by the operating-set 50 side for game machines concerned.

[0115] (3) while the response means 130 is formed in the response means arrangement section 133 which drawing 36 which attaches and shows the same sign to a corresponding point with form drawing 1 of the 3rd operation showed the form of operation of the 3rd of the operating set for game machines by this invention, and was formed in the interior of the 1st operation supporter 4 of the lower case 3 almost horizontally -- the lower case 3 concerned -- the angular-velocity sensor (gyroscope sensor) 155 of the operating set 120 for game machines concerned is mostly formed in a central field

[0116] the response means 130 has six sides, as shown in drawing 37 -- almost -- the inside of the case 131 of a cube configuration -- vibration -- therefore, the member 140 is hung by two or more coiled spring 151A-151H free [vibration]

[0117] this vibration -- a member 140, as shown in drawing 38 which attaches and shows the same sign to a corresponding point with drawing 37 With X shaft vibration children 141A and 141B who vibrate to X shaft orientations, and Y shaft vibration children 141C and 141D who vibrate to Y shaft orientations Z shaft vibration children 141E and 141F who vibrate to Z shaft orientations -- having -- each vibrator 141A-141F -- vibration -- it is fixed by part for the core of a member 140, and is unified as a whole

[0118] An electric conduction line is wound around an iron core in the same direction at X shaft vibration children

141A and 141B, respectively, and Coils 143A and 143B are formed. Therefore, if drive current I is energized in the coils 143A and 143B concerned, magnetic fields Ha and Hb will occur in the direction according to the sense of the drive current I concerned.

[0119] While X shaft vibration child 141A moves in the direction which approaches the magnet 132A concerned by receiving attraction from magnet 132A of the case 131 (drawing 37) which counters the point of the X shaft vibration child 141A concerned at this time By receiving repulsive force from magnet 132B of the case 131 (drawing 37) which counters the point of the X shaft vibration child 141B concerned, X shaft vibration child 141B moves in the direction which separates from concerned magnet 132B. consequently, vibration united with X shaft vibration children 141A and 141B -- a member 140 moves to a direction (the right direction of the X-axis) like X shaft vibration children 141A and 141B as a whole

[0120] On the other hand, when drive current I energizes the drive current (-I) of a retrose in the coils 143A and 143B of the X-axis signal children 141A and 141B concerned, it is a magnetic field to the direction according to the sense of the drive current-I concerned. - Ha and -Hb occur.

[0121] While X shaft vibration child 141A moves in the direction which separates from concerned magnet 132A by receiving repulsive force from magnet 132A at this time, X shaft vibration child 141B moves in the direction close to the magnet 132B concerned by receiving attraction from magnet 132B. consequently, vibration united with X shaft vibration children 141A and 141B -- a member 140 moves to a direction (the negative direction of the X-axis) like X shaft vibration children 141A and 141B as a whole

[0122] changing the sense of the drive current I energized to X shaft vibration children 141A and 141B in this way for a short time -- vibration -- a member 140 vibrates between magnet 132A and 132B to X shaft orientations as a whole

[0123] Moreover, Y shaft vibration children 141C and 141D vibrate to Y shaft orientations between magnet 132C of the case 131 (drawing 37) which counters each point, and 132D by energizing switching the direction for drive current to the coils 143C and 143D similarly wound around the Y shaft vibration children 141C and 141D concerned, respectively also in Y shaft vibration children 141C and 141D. consequently, vibration united with Y shaft vibration children 141C and 141D -- a member 140 vibrates in a direction (Y shaft orientations) like Y shaft vibration children 141C and 141D as a whole

[0124] Furthermore, Z shaft vibration children 141E and 141F vibrate to Z shaft orientations between magnet 132E of the case 131 (drawing 37) which counters each point, and 132F by energizing switching the direction for drive current to the coils 143E and 143F similarly wound around the Z shaft vibration children 141E and 141F concerned, respectively also in Z shaft vibration children 141E and 141F. consequently, vibration united with Z shaft vibration children 141E and 141F -- a member 140 vibrates in a direction (Z shaft orientations) like Z shaft vibration children 141E and 141F as a whole

[0125] if the period which switches the energization direction of drive current I is incidentally changed -- vibration -- if the oscillation frequency of a member 140 can be changed and the current value of drive current I is changed -- vibration -- the force (namely, acceleration) of joining a member 140 can be changed

[0126] the coils 143A-143F corresponding to each shaft in this way -- drive current I -- energizing -- vibration -- if a member 140 is vibrated, this vibration will be transmitted to the 1st operation supporter 4 through the response means arrangement section 133 (drawing 36), as shown in drawing 39 As for vibration transmitted to the 1st operation supporter 4, the whole **** intermediary equipment comes to vibrate to the case of the 1st operation supporter 4 lower case 3 and upper case 2 concerned. thus, vibration -- vibrational states, such as the direction of vibration therefore generated in a member 140, an amplitude, and acceleration, -- vibration of the response means 130 -- therefore, arbitration can be changed to the drive current I added to each coils 143A-143F prepared in the member 140

[0127] Incidentally, as space which can set the response means 130, as are shown in drawing 40 , and the 1st operation supporter 4 or the 2nd operation supporter 5 gripped and supported in the palm can be used and it is further shown in drawing 41 , the space for a simultaneously core of the operating set 120 for game machines inserted into the 1st operation supporter 4 and 5 can be formed greatly, and this field can be used.

[0128] The response means 130 thus, for example, by having attached in the part gripped and supported with the 1st operation supporter 4 of the lower case 3, i.e., a left palm As shown in drawing 42 , in case the operating set 120 for game machines and the main part 27 of a game machine are connected to the monitors 33, such as a television receiver, and a game is performed [when a partner is beaten in the kind of game, for example, the game of a sport combative, the mark is hit by the shooting game and a target of operation receives an attack on a screen by airplane] the specific reply signal of the main part 27 of a game machine -- vibration of the response means 130 -- a member 140 can be vibrated and fixed time vibration of the operating-set 120 whole for game machines can be carried out

[0129] Thus, it can feed back to the user who equipment equipment 120 the very thing causes vibration to operation by a user's operation button, and therefore uses for it as somesthesia, and presence can be raised further.

[0130] It has the covering device material 28 which the CD-ROM driver which is a video record medium is built in, and the main part 27 of a game machine contains CD-ROM in the upper surface of the main part 27 of a game machine as shown in drawing 42 here, and covers, the open/close switch 29 which carries out opening and closing of the covering device material 28, the electric power switch 30 which supplies a power supply, the reset switch 31 which makes an initial state operation of the main part 27 of a game machine, and structure which formed the connection 32 which can connect two operating sets. By connecting the connector 20 of the operating set 120 for game machines to this connection 32, two-way communication with the main part 27 of a game machine becomes possible. In addition, in the form of this operation, the composition which connected one operating set 120 for game machines explains.

[0131] As described above, in order to make the response means 130 drive and to vibrate the operating-set 120 whole for game machines, it is required between the operating set 120 for game machines, and the main part 27 of a game machine to be the composition equipped with the two-way communication function. This two-way communication function can be performed by connecting with the main part 27 of a game machine the connector 20 which performs the operating set 120 for game machines, and bidirectional serial communication, as shown in drawing 43 .

[0132] I/O-interface SIO to which the composition which performs the two-way communication function by the side of the operating set 120 for game machines performs the main part 27 of a game machine, and serial communication, the one-chip microcomputer (this is called microcomputer below) which are parallel I/O interfaces PIO, CPU, RAM, and ROM which input the operation data from two or more operation buttons, and vibration of the response means 130 -- it consists of coil drivers 164 which vibrate a member 140

[0133] The coils 143A and 143B of X shaft vibration children 141A and 141B of a member 140 vibrate by X shaft-orientations drive current SDX from the coil driver 164. vibration -- The coils 143C and 143D of Y shaft vibration children 141C and 141D of a member 140 vibrate by Y shaft-orientations drive current SDY from the coil driver 164. vibration -- vibration -- the coils 143E and 143F of Z shaft vibration children 141E and 141F of a member 140 vibrate by Z shaft-orientations drive current SDZ from the coil driver 164

[0134] If it has structure which prepared serial I/O-interface SIO which performs serial communication between the operating sets 120 for game machines at the main part 27 side of a game machine and the connector 20 of the operating set 120 for game machines is connected, it connects with serial I/O-interface SIO by the side of the operating set 120 for game machines through this connector 20, and has the composition that bidirectional means of communications, i.e., bidirectional serial communication, can be performed. In addition, the detailed composition of others of the main part 27 of a game machine is omitted.

[0135] The signal line and the control line which perform bidirectional serial communication The signal line TXD (Transmit X' for Data) for data transmission which sends data from the main part 27 of a game machine to the operating set 120 for game machines, The signal line RXD (Received X' for Data) for data transmission which sends data to the main part 27 side of a game machine from the operating-set 120 side for game machines, The signal line SCK (Serial Clock) for serial synchronous clocks which extracts data from the signal lines TXD and RXD for each data transmission, the control line DTR for performing establishment, discontinuation, etc. of communication of the operating set 120 for game machines which are a terminal side (Data Terminal Ready) It consists of the control lines DSR for the flow controls for performing a lot of data transfer (Data Set Ready).

[0136] moreover, as shown in the cable which consists of the signal line and the control line which perform this bidirectional serial communication at drawing 43 , the cable 35 for power supplies taken out from the power supply by the side of the main part 27 of a game machine directly other than a signal line and the control line is contained, and this cable 35 for power supplies is connected to the coil driver 164 by the side of the operating set 120 for game machines -- having -- vibration -- the power supply which vibrates a member 140 is supplied

[0137] As mentioned above about drawing 36 here, the angular-velocity sensor 155 which detects the angular rate of rotation of the circumference of each axis of rotation (the X-axis, Y-axis, and Z-axis) of the operating set 120 for game machines concerned is formed in the operating set 120 for game machines. This angular-velocity sensor 155 has Z axial-angle speed sensor 155C which detects the angular rate of rotation of the circumference of X axial-angle speed sensor 155A which detects the angular rate of rotation of the circumference of the X-axis, Y axial-angle speed sensor 155B which detects the angular rate of rotation of the circumference of the Y-axis, and the Z-axis, and the angular-rate-of-rotation component of the circumference of each shaft (the X-axis, Y-axis, and Z-axis) is detected according to angle change of the operating set 120 for game machines.

[0138] Drawing 44 shows the composition of the gyroscope sensor (Gyroscope Sensor) 156 of the piezo-electric oscillatory type which constitutes Z axial-angle speed sensor 155C, and is the constant elastic metal material elinvar (Elinvar) of the right triangle pole. Material 156D is provided so that the center line may tend toward Z shaft orientations. On the front face of this constant elastic metal material elinvar material 156, piezo-electric ceramic element 156A, By detecting Coriolis force for the movement component of the circumference of the Z-axis of the

movement of the operating set 120 for game machines to which 156B and 156C were stuck on, and the gyroscope sensor 156 concerned was fixed. Vibration of constant elastic metal material elinvar material 156D is changed into vibratory torque equal to the vibration frequency of a tuning fork, and it is made as [take / as an amount of displacement of voltage / the angular-rate-of-rotation component of the circumference of the Z-axis / this].

[0139] It is prepared so that the gyroscope sensor of composition as well as the gyroscope sensor 156 shown in drawing 44 also in X axial-angle speed sensor 155A and Y axial-angle speed sensor 155B may incidentally tend toward X shaft orientations and Y shaft orientations, respectively.

[0140] Oscillator-circuit 155E vibrates the piezo-electric ceramic element 156A concerned by sending out oscillation signal S156A to piezo-electric ceramic element 156A for excitation by drawing 45 showing the composition of Z axial-angle speed sensor 155C containing the gyroscope sensor 156 here. By reaching like other two piezo-electric ceramic elements 156B and 156C at the time of no rotating, vibration of piezo-electric ceramic element 156A for excitation is doubled with the phase according [oscillating detecting-signal S156B and S156C of a respectively equal amplitude] to phase-compensator 156G from these two piezo-electric ceramic elements 156B and 156C, and is sent out to differential-amplifier circuit 156F.

[0141] The signal level of differential-amplifier output signal S156F outputted from differential-amplifier circuit 156F at this time is mostly set to "0", and the voltage value of angular-velocity detecting-signal S155Z outputted from direct-current amplifying-circuit 156I is also set to about 0 [V] according to this.

[0142] On the other hand, when the operating set 120 for game machines is operated, according to the rotation component of the circumference of the Z-axis of the movement concerned, the gyroscope sensor (constant elastic metal material elinvar material 156D) of Z axial-angle speed sensor 155C receives a strain, and the amplitude of oscillating detecting-signal S156B outputted from two piezo-electric ceramic elements 156B and 156C and S156C serves as a mutually different value.

[0143] Thereby, differential-amplifier output signal S156F of the signal level according to the amplitude difference are sent out to detector-circuit 156H from differential-amplifier circuit 156F. The signal level of differential-amplifier output signal S156F detects the component by the side of positive, and detector-circuit 156H send this out to direct-current amplifying-circuit 156I.

[0144] Direct-current amplifying-circuit 156I outputs angular-velocity detecting-signal S155Z of the voltage level according to the angular-rate-of-rotation component of the circumference of the Z-axis of the gyroscope sensor 156 by amplifying an in one direction flowed part of the detection output wave sent out from detector-circuit 156H. Thus, angular-velocity detecting-signal S155Z of the circumference of the obtained Z-axis is sent out to an analog / digital conversion circuit 157 in drawing 43, is changed into a digital signal and sent out to a microcomputer.

[0145] Incidentally, X axial-angle speed sensor 155A and Y axial-angle speed sensor 155B as well as Z axial-angle speed sensor 155C mentioned above about drawing 45 become with composition, and send out angular-velocity detecting-signal S155A according to the angular-rate-of-rotation component of the circumference of the X-axis, and angular-velocity detecting-signal S155B according to the angular-rate-of-rotation component of the circumference of the Y-axis to a microcomputer through an analog / digital conversion circuit 157, respectively.

[0146] each shaft (the X-axis --) with which the microcomputer of the operating set 120 for game machines is obtained from this angular-velocity sensor 155. Based on the angular-rate-of-rotation component of the circumference of a Y-axis and the Z-axis, the posture of the operating set 120 for game machines is judged. vibration -- X shaft-orientations drive current SDX, Y shaft-orientations drive current SDY, and Z shaft-orientations drive current SDZ which are given to a member 140 -- an amendment -- by things vibration hung by the case 131 (drawing 37) -- the oscillating change by the self-weight of a member 140 can be avoided, and the vibration as the data for dynamic transfer always specified to be the main part 27 side of a game machine therefore can be generated.

[0147] The bidirectional serial communication procedure performed between the operating set 120 for game machines and the main part 27 of a game machine here. For example, in order for the main part 27 of a game machine shown in drawing 43 to communicate with the operating set 120 for game machines and to incorporate the operation data (button information) of the operation button of the 1st - the 4th control unit 7, 8, 9, and 10. First, the main part 27 of a game machine will check that it has therefore been chosen as the control line DTR, and will be in the receiving waiting state of the signal line TXD following it. Then, the main part 27 of a game machine sends out the identification code which shows the operating set 120 for game machines to the signal line TXD for data transmission. Thereby, the equipment 120 for game machines receives this identification code by the signal line TXD.

[0148] By showing the operating set 120 for game machines, identification code starts communication with the main part 27 of a game machine after this. That is, from the main part 27 of a game machine, control data etc. is transmitted to the operating-set 120 side for game machines through the signal line TXD for data transmission, and the operation data operated with the operation button are conversely transmitted to the main part 27 of a game machine through the

signal line RXD for data transmission from the operating set 120 for game machines. Thus, serial communication bidirectional in between the main part 27 of a game machine and the operating sets 120 for game machines is performed, and this communication is ended when the main part 27 of a game machine outputs selection stop data through the control line DTR.

[0149] if it has such bidirectional serial communication facility, while mainly being able to transmit the operation data of an operation button to the main part 27 side of a game machine from the operating-set 120 side for game machines - the signal line TXD for the data transmission from the main part 27 side of a game machine -- minding -- vibration of the response means 130 -- the data for dynamic transfer which vibrate a member 140 can be sent out to the operating-set 120 side for game machines this vibration -- therefore, the data for dynamic transfer which vibrate a member 140 are beforehand set as CD-ROM for games carried in the main part 27 of a game machine, and feedback by dynamic transfer of fixed time is performed to operating-set 120 the very thing for game machines from the main part 27 of a game machine according to the target of the user who performs a game of operation

[0150] thus, the data transmitted and received between the main part 27 of a game machine and the operating set 120 for game machines consist of 5 bytes of data, as shown in drawing 46 -- having -- every byte -- a packet -- it is-izing and transmitted

[0151] The data transmitted to the operating set 120 for game machines through a signal line TXD in drawing 46 from the main part 27 of a game machine The data 0x01 expressed with a hexadecimal as a protocol identifier and 0x42 are transmitted to the 1st byte and the 2nd byte. Assignment of data is unfixed and the 3rd byte of oscillating control data [as opposed to the response means 130 (vibration member 140) of the operating set 120 for game machines as dynamic transfer / the 4th byte and the 5th byte of / data TXD1 and TXD2] is transmitted.

[0152] namely, -- as the data for the triplet which the data "01" (binary digit) which express that it is the control command of a rocking equipment to 2 bits of most significant are assigned, and follows this in the 4th byte of data as shown in drawing 47 -- vibration -- oscillating directional-control data DCOM showing the oscillating direction of a member 140 It is assigned.

[0153] vibration which mentioned above this oscillating directional-control data DCOM about drawing 37 -- each direction (the X-axis --) of a member 140 X shaft vibration children 141A and 141B prepared corresponding to the Y-axis and the Z-axis, It is the vibrator prepared corresponding to one of shaft orientations among Y shaft vibration children 141C and 141D and Z shaft vibration children 141E and 141F, or data showing such combination, and, therefore, seven kinds of oscillating directions are specified to be data of a triplet. Incidentally, seven kinds of this oscillating direction is the combination of the combination of the combination of X shaft orientations, Y shaft orientations, Z shaft orientations, X shaft orientations, and Y shaft orientations, X shaft orientations, and Z shaft orientations, Y shaft orientations, and Z shaft orientations, and the combination of all shaft orientations.

[0154] Moreover, oscillating directional-control data DCOM which specify the oscillating direction in the data shown in drawing 47 The oscillating data DX of X shaft orientations are added to the 4th byte of least-significant triplet, the oscillating data DY of Y shaft orientations are added to the 5th byte of most-significant triplet, and the oscillating data DZ of Z shaft orientations are added to the triplet following the oscillating data DY of the Y shaft orientations concerned. Thereby, it is oscillating [the 4th byte of] directional-control data DCOM. According to the oscillating direction therefore specified or its combination, the oscillating data DX, DY, and DZ of each shaft orientations are used.

[0155] These oscillating data DX, DY, and DZ express the current value at the time of therefore vibrating the vibrator of each shaft to the data of a triplet, respectively. the microcomputer of the operating set 120 for game machines By changing each oscillating data DX, DY, and DZ concerned into an analog value, and therefore driving the coil driver 164 (drawing 43) to the analog signal concerned The drive current of current value therefore expressed by the oscillating data DX, DY, and DZ is added to the coil of the vibrator corresponding to the shaft therefore specified to be received data at this time.

[0156] This point is explained to the flow chart of drawing 48 which attaches and shows the same sign to a corresponding point with drawing 23 and drawing 24 , and drawing 49 at a below ***** detail, referring to drawing 36 and drawing 43 .

[0157] The main part 27 of a game machine is equipped with specific CD-ROM for games, and the start of a game is set with the start switch 11 of the operating set 120 for game machines shown in drawing 36 , and various functions are set up by operation of the selection switch 12, and it is in the state where a game is performed by operation of the 4th of the 1st - control units 7, 8, 9, and 10.

[0158] And the microcomputer which becomes a game start from CPU, RAM, and ROM of the operating set 120 for game machines which were shown in ***** and drawing 43 is continuously monitored in the step ST 21 which shows drawing 48 whether the data for dynamic transfer of a hit have been sent through serial I/O-interface SIO through serial

interface SIO from the main part 27 side of a game machine. vibration shown in this data for dynamic transfer at drawing 43 -- the oscillating direction and current-value data of a member 140 are contained and the current which is made to drive the coil driver 164 and is supplied from the main part 27 of a game machine when the data for dynamic transfer are in the data sent from the main part 27 side of a game machine while the game is advancing -- as X shaft-orientations drive current SDX, Y shaft-orientations drive current SDY, and Z shaft-orientations drive current SDZ -- vibration -- predetermined-time supply is carried out at the coils 143A-143F of a member 140

[0159] That is, after judging the dynamic transfer data TXD1 and TXD2 (drawing 47) in the data received by the operating-set 120 side for game machines at a step ST 1, microcomputer processing is carried out in a step ST 2. While the microcomputer incorporates beforehand angular-velocity detecting-signal S155X, S155Y, and S155Z which are obtained from the angular-velocity sensor mentioned above in drawing 44 and drawing 45 in a step ST 31 and judging the posture of the operating set 120 for game machines based on the angular-velocity detecting-signal S155X concerned, S155Y, and S155Z at this time, based on the attitude information concerned, the data TXD1 and TXD2 for dynamic transfer are amended.

[0160] this amendment -- vibration -- as the drive current value impressed to each coils 143A-143F of a member 140 -- vibration -- while a member 140 considers as drive current value which generates magnetism few in the direction therefore pulled to gravity -- vibration -- it is made as [consider / a member 140 / with the direction therefore pulled to gravity / at an opposite direction / as drive current value which generates many magnetism]

[0161] therefore, a vibration also according [*****] to gravity at what angle (posture) to the perpendicular direction in the operating set 120 for game machines -- the suitable vibration according to game advance which avoids oscillating change of a member 140 and is therefore set as CPU by the side of the main part 27 of a game machine -- vibration -- therefore, a member 140 can be generated

[0162] Thus, the direction therefore specified to be the oscillating directional-control data DCOM (drawing 47) among the amended dynamic transfer data (X shaft orientations) The oscillating data DX showing the oscillating component of Y shaft orientations and Z shaft orientations, or each of these shaft orientations that be put together The data amended based on DY and DZ are changed into an analog signal in step ST22A, step ST22B, and step ST22C, respectively. Therefore in continuing step ST23A, step ST23B, and step ST23C, the coil driver 164 (drawing 43) is driven to an analog signal, respectively. in this way -- the coil driver 164 to drive current I -- vibration -- the direction specified by supplying the coils 141A-141F of a member 140 in step ST24A, step ST24B, and step ST24C at this time -- vibration -- a member 140 vibrates

[0163] on the other hand, the data supplied to the operating set 120 for game machines from the main part 27 of a game machine are dynamic -- when transfer data TXD1T and TXD2 are not included, the microcomputer of the operating set 120 for game machines awaits the state where a ***** operation button is operated by the step ST 5 from the step ST 1 of drawing 48 If an affirmation result is obtained here, this means that the operation button of the operating set 120 for game machines was operated, and therefore, a microcomputer will incorporate the posture of the operating set 120 for game machines to the continuing step ST 31 from the ***** angular-velocity sensor 155 to angular-velocity detecting-signal S155X, S155Y, and S155Z at this time while incorporating ***** and operation data through parallel I/O-interface PIO to a step ST 6.

[0164] Angular-velocity detecting-signal S155X, S155Y, and S155Z which were inputted into the microcomputer are used as data for amendment based on the posture of the operating set 120 for game machines mentioned above about step ST22A-ST24A, step ST22B-ST24B, and step ST22C-ST24C.

[0165] Moreover, the operation data inputted into the microcomputer are processed in the step ST 2 of drawing 48 , are changed into serial data in a step ST 7, and are transmitted to the main part 27 of a game machine through serial I/O-interface SIO (drawing 43). Then, the operating set 120 for game machines will be in the state of awaiting the data from the main part 27 of a game machine in a step ST 25.

[0166] As shown in drawing 46 , the data transmitted to the main part 27 of a game machine from the operating set 120 for game machines assign the identifier of the operating set 120 for game machines to 4 bits of the 2nd byte of high orders, and assign the data of a data length/2 to the 4 bits of the 2nd byte of the low ranks concerned. Moreover, the identifier (ACK) showing the data concerned being response data is assigned to the 3rd byte, and the data of the button operated in the operating set 120 for game machines are assigned to the 4th byte following this, and the 5th byte.

[0167] If the data from this operating set 120 for game machines are transmitted to the main part 27 of a game machine, the main part 27 of a game machine will receive the data from the operating set 120 for game machines in the step ST 26 shown in drawing 49 , and will distinguish a hit state for comparison with the data of a target of operation, and the serial data which received in a line intermediary and a step ST 9 in the continuing step ST 8.

[0168] When the data of a target of operation and the serial data which received are in agreement here (i.e., when it hits) While displaying the target of operation which carried out the ***** hit on a step ST 10 on the screen of a

monitor from a step ST 9 The data for dynamic transfer are outputted in a step ST 11, it changes into serial data in a step ST 12, and the operating set 120 for game machines is answered as a specific reply signal through serial I/O-interface SIO (drawing 43). if it is detected by the microcomputer of the operating set 120 for game machines as the step ST 1, the step ST 2, and Step ST 3 of drawing 48 explained this data for dynamic transfer -- a power supply -- the vibration from the coil driver 164 (drawing 43) -- the coils 143A-143F of a member 140 are supplied, this is vibrated, and, therefore, the operating-set 120 whole for game machines vibrates to the vibration

[0169] On the other hand, if a negative result is obtained in a step ST 9 (drawing 49) The data of a target of operation and the serial data of this from the operating set 120 for game machines do not correspond, That is, it means having not hit, and at this time, CPU of the main part 27 of a game machine awaits the data from the operating set 120 for ***** game machines to a step ST 27, after displaying a target of operation on a step ST 13 on the screen of a monitor based on a ***** operation button.

[0170] In CPU of the main part 27 of a game machine, data processing is performed to every 1 / 60 seconds (one frame), and the dynamic transfer data TXD1 and TXD2 are also transmitted to the operating set 120 for game machines every [1/] 60 seconds from the main part 27 of a game machine according to this. Therefore, the drive current value energized by each coils 143A-143F of the operating set 120 for game machines and its direction change based on dynamic transfer data every [1/] 60 seconds.

[0171] in this way -- the operating set 120 for game machines from the main part 27 of a game machine -- receiving -- dynamic transfer data -- transmitting -- this -- being based -- vibration -- by vibrating a member 140 in the predetermined direction, the somesthesia according to the game unfolded on the screen of a monitor is fed back to the user who operates the operating set 120 for game machines as vibration of the operating set 120 for game machines, and he can advance the high game of presence much more

[0172] In addition, in the form of the 3rd operation of a ****, as mentioned above about drawing 47 the dynamic transfer data TXD1 and TXD2 transmitted to the operating set 120 for game machines from the main part 27 of a game machine every [1/] 60 seconds -- therefore -- vibration -- by specifying the drive current value added to each coils 143A-143F of a member 140 Although the current value of each coils 143A-143F concerned and its direction described the case where it changed every [1/] 60 seconds by the shortest this invention divides for 1 / 60 seconds in further two or more periods, and you may make it specify drive current value and its direction for every division period by increasing the byte count of the data shown not only in this but in drawing 47 , and transmitting two or more oscillating data DX, DY, and DZ of each shaft orientations.

[0173] thus -- if it carries out -- an one-frame period -- setting -- the number of the oscillating data DX, DY, and DZ -- vibration -- by the ability changing the drive current value added to each coils 143A-143F of a member 140, and its direction the transfer timing of the dynamic transfer data TXD1 and TXD2 transmitted to the operating set 120 for game machines from the main part 27 of a game machine -- one frame (1 / 60 seconds) every -- ***** The drive current which changes like an analog signal by the time interval finer than the one-frame period concerned can be added to each coils 143A-143F.

[0174] Moreover, it sets in the form of the 3rd operation of a ****. vibration, although the case where the current value in each timing of the drive current added to each coils 143A-143F of a member 140 and its direction were transmitted to the operating set 120 for game machines by packet data from the main part 27 of a game machine as dynamic transfer data TXD1 and TXD2 was described this invention transmits the data not only showing this but the configuration of drive current wave type to the operating set 120 for game machines from the main part 27 of a game machine, and you may make it generate the current wave form according to the data point by the operating-set 120 side for game machines concerned.

[0175] moreover, the form of the 3rd operation of a **** -- setting -- a case 131 -- coiled spring 151A-151F -- therefore -- vibration -- although the case where a member 140 was hung was described -- that a hanging means uses not only this but flat spring **** -- further -- a liquid -- vibration -- you may make it make a member 140 float

[0176] moreover, vibration which has a salient as the coil section in the gestalt of the 3rd operation of a **** in each axial (the X-axis, a Y-axis, and Z-axis) direction, although the case where a member 140 was used was described this invention embeds a magnet at each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) of not only this but a spherical member, respectively, and you may make it prepare the coil section of X shaft orientations, Y shaft orientations, and Z shaft orientations in the case side which counters the magnet concerned.

[0177] moreover, the vibrator (X shaft vibration child 141A --) which vibrates in the form of the 3rd operation of a ****, respectively to each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) vibration which unified 141B, Y shaft vibration children 1412C and 141D, and Z shaft vibration children 141E and 141F -- although the case where a member 140 was used was described, you may make it this invention prepare the vibrator which vibrates individually not only to this but to each shaft orientations, respectively in another object

[0178] In this case, the response means 75 of the voice coil composition mentioned above, for example about drawing 27 and drawing 28 is individually arranged with sense which vibrates, respectively to X shaft orientations, Y shaft orientations, and Z shaft orientations, as shown in drawing 50. vibration of one which vibration of two or more response meanses 75 to vibrate to each shaft orientations was compounded, and was mentioned above about drawing 37 in this operating set 160 for game machines by giving the oscillating data DX, DY, and DZ of each shaft orientations mentioned above about drawing 47 as drive current value of each response means 75, and vibrating them in such composition -- vibration occurs in the arbitrary directions like a member 140 (drawing 37)

[0179] also in this case, the drive current value which therefore supervises the posture of the operating set 160 for game machines in the angular-velocity sensor 155, and is supplied to each response means 75 -- an amendment -- vibration which was not concerned with the posture but was always specified by things from the main part 27 of a game machine to the operating set 160 for game machines can be generated

[0180] Moreover, although the case where a response means 75 for vibrator to go to a rectilinear and to generate vibration in the direction of one dimension in the operating set 160 for game machines of drawing 50 was arranged, respectively to each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) was described You may make it this invention establish not only this but the response means 21 by the motor 24 mentioned above about drawing 2 in addition to three response meanses 75 arranged at each shaft orientations, as shown in drawing 51.

[0181] In this case, the response means 75 of voice coil composition can generate [consumed electric current] many strong vibration, and the response means 21 by the motor 24 notes the point that the consumed electric current generates a few weak vibration. In generating a short-time vibration strongly comparatively In making it combine and vibrate according to the oscillating direction of which the response means 75 of voice coil composition prepared in each shaft orientations is required and generating a weak vibration of comparatively long time While being able to generate vibration of the various directions and strength according to advance of a game with rich presence by driving the response means 21 by the motor 24 By the ability making the big response means 75 of the consumed electric current drive, only when required, the consumed electric current which the vibration as the operating-set 170 whole for game machines concerned takes can be reduced.

[0182] Moreover, in the operating set 160 for game machines of drawing 50, although the case where a response means 75 for vibrator to go to a rectilinear and to generate vibration was arranged, respectively to each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) was described, this invention is good also not only as this but a response means 21 by the motor 24 which mentioned above 1 of the response meanses prepared in each shaft orientations, or two about drawing 1.

[0183] That is, the operating set 180 for game machines shown in drawing 52 shows the case where the response means 21 by the motor 24 mentioned above about drawing 2 is established in the two-dimensional direction of a X-Z flat surface as a means to generate vibration, and has the response means 21 concerned and a response means 75 of voice coil composition to make Y shaft orientations (the direction of one dimension) generate vibration.

[0184] Thus, if the response meanses 75 and 21 are arranged, while being able to make a cross direction feel a strong shock (vibration) to the user who operates the operating set 180 for game machines using the response means 75 of voice coil composition especially, a comparatively small vibration can be made to feel in the direction of four directions for a long time.

[0185] Moreover, although the case where the response means 75 of voice coil composition was arranged, respectively to each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) was described in the operating set 160 for game machines of drawing 50 this invention is replaced with the response means 75 of voice coil composition as shown not only in this but in drawing 53. You may arrange two response meanses 21A and 21B to have a motor 24, respectively so that the oscillating direction may turn into the direction of a X-Z flat surface, and the direction of a Y-Z flat surface (or the direction of a X-Y flat surface).

[0186] According to this operating set 190 for game machines, the various vibration according to advance of a game can be fed back to a user by generating vibration to the two directions of a flat surface. As the oscillating data incidentally transmitted from the main part 27 of a game machine to the operating set 190 for game machines which established two response meanses 21A and 21B are shown in drawing 54, the data "01" (binary digit) showing being the control command of a rocking equipment are assigned to 2 bits of the 4th byte of most significants, and the analog-control data MA 1 showing the drive current value added to 1st response means 21A are assigned to the 4th byte of the least-significant triplet concerned. Moreover, the analog-control data MA 2 showing the drive current value added to 2nd response means 21B are assigned to the 5th byte of the best triplet. Thereby, the microcomputer of the operating set 190 for game machines which received the two analog-control data MA1 and MA2 concerned energizes the drive current therefore specified to be analog data MA1 and MA2 to each response meanses 21A and 21B by changing the

analog-control data MA1 and MA2 into an analog value, and therefore driving a coil driver to the analog signal concerned.

[0187] Moreover, in drawing 54, the digital-control data CONTD1 showing whether the drive current of the value beforehand decided to 1st response means 21A is energized are assigned to the 5th byte of least significant bit. By assigning "1" or "0" as this digital-control data CONTD1, it is determined whether energize drive current to 1st response means 21A.

[0188] Moreover, the digital-control data CONTD2 showing whether the drive current of the value beforehand decided to be the 5th byte of least significant to the 2nd bit to 2nd response means 21B is energized are assigned like this. By assigning "1" or "0" as this digital-control data CONTD2, it is determined whether energize drive current to 2nd response means 21B.

[0189] This point is explained to the flow chart of drawing 55 at a below ***** detail. The microcomputer of the operating set 190 (drawing 53) for game machines judges whether the received data concerned are control data over the operating set for game machines with a rocking equipment by detecting 2 bits of the 4th byte of most significant of received data in the continuing step ST 42 from the main part 27 of a game machine, after going into the procedure based on received data and completing reading of data in a step ST 41 from the step ST 2 of drawing 55, if the data shown in drawing 54 are received.

[0190] If a negative result is obtained here, this will express that received data are not control data over an operating set with a rocking equipment, i.e., it is not the control data over the operating set 190 for game machines connected to the main part 27 of a game machine at this time, and the microcomputer of the operating set 190 for game machines will await ***** and new received data to the above-mentioned step ST 41 at this time.

[0191] On the other hand, it expresses that this is the control data over the operating set 190 for game machines with a rocking equipment in the received data if an affirmation result is obtained in a step ST 42, and the microcomputer of the operating set 190 for game machines concerned judges whether the analog-control data MA 1 to 1st response means 21A exist in the 4th byte of received data in the continuing step ST 43 at this time.

[0192] If an affirmation result is obtained here, it will mean that the analog-control data MA 1 exist to the 4th byte of least-significant triplet of received data, and the microcomputer of the operating set 190 for game machines will add the drive current of the value therefore specified to be a step ST 44 by the analog-control data MA 1 to the motor 24 of response means 21A of ***** 1st at this time.

[0193] On the other hand, if a negative result is obtained in a step ST 43, this means that the analog-control data MA 1 do not exist in the 4th byte of least-significant triplet of received data (for example, the analog-control data MA 1 should be "0"). At this time, the microcomputer of the operating set 190 for game machines The digital-control data CONTD1 to 1st response means 21A currently assigned to a step ST 45 at the 5th byte of least significant bit of ***** received data (drawing 54) are read. Based on the digital-control data CONTD1 concerned, the motor 24 of 1st response means 21A is controlled to ON or an OFF state.

[0194] Then, the microcomputer of the operating set 190 for game machines judges whether the analog-control data MA 2 to 2nd response means 21B exist in a step ST 46 at the 5th byte of ***** and received data.

[0195] If an affirmation result is obtained here, it will mean that the analog-control data MA 2 exist to the 5th byte of most-significant triplet of received data, and the microcomputer of the operating set 190 for game machines will add the drive current of the value therefore specified to be a step ST 47 by the analog-control data MA 2 to the motor 24 of response means 21B of ***** 2nd at this time.

[0196] On the other hand, if a negative result is obtained in a step ST 46, this means that the analog-control data MA 2 do not exist in the 5th byte of most-significant triplet of received data (for example, the analog-control data MA 1 should be "0"). At this time, the microcomputer of the operating set 190 for game machines The digital-control data CONTD2 to 2nd response means 21B currently assigned to a step ST 48 at the 2nd bit are read in the 5th byte of least significant of ***** received data (drawing 54). Based on the digital-control data CONTD2 concerned, the motor 24 of 2nd response means 21B is controlled to ON or an OFF state.

[0197] the analog-control data MA1 and MA2 or the digital-control data CONTD1 and CONTD2 which are contained in received data in this way when the microcomputer of the operating set 190 for game machines repeats the processing shown in drawing 55 whenever it receives data from the main part 27 of a game machine -- being based -- the response meanses 21A and 21B -- analog control -- or a digital control can be carried out

[0198] In this processing, when the analog-control data MA1 and MA2 exist in received data, the drive current of the current value finely specified according to the analog-control data MA1 and MA2, respectively can be added to each motor 24 of the response meanses 21A and 21B by giving priority to and using the analog-control data MA1 and MA2 concerned.

[0199] In addition, although the case where the digital-control data CONTD2 to the 2nd response means 21B

concerned were detected was described in the microcomputer processing shown in drawing 55 when the analog-control data MA 2 to 2nd response means 21B did not exist As this invention is shown in drawing 56 which attaches and shows the same sign to a corresponding point not only with this but drawing 55 When the analog-control data MA 2 to 2nd response means 21B do not exist in received data as a judgment result in a step ST 46, the ** which does not detect the digital-control data CONTD2 to 2nd response means 21B -- a step ST 41 -- ***** -- you may make it await reception of new data

[0200] If it does in this way, in the system which does not assign the digital-control data CONTD2 to 2nd response means 21B, it can judge whether analog control of the 2nd response means 21B is carried out.

[0201] Moreover, although the case where every one analog-control data MA1 and MA2 (triplet) to the 1st and 2nd response meanses 21A and 21B was assigned, respectively was described, you may make it this invention assign two or more analog-control data in the data shown in drawing 54 to the 1st and 2nd response main edges 21A and 21B not only using this but using other free areas, respectively.

[0202] If it does in this way, the timing which sends out the data concerned can change the drive current value to which ***** also adds only the number of the analog-control data to one response means to a response means for every period which divided the one-frame period by every one frame (1 / 60 seconds). Therefore, a response means is controllable to change of the current value thereby near an analog signal.

[0203] Moreover, angular-velocity detecting-signal S155A obtained from the angular-velocity sensor 155 formed in the operating set 120 (drawing 36) for game machines in the form of the 3rd operation of a ****, S155B and S155C -- being based -- the microcomputer by the side of the operating set 120 for game machines -- the posture of the operating set 120 for game machines concerned -- judging -- the posture concerned -- responding -- vibration, although vibration of a member 140 was described about the amendment case this invention Angular-velocity detecting-signal S155A not only from this but an angular-velocity sensor, Once transmit S155B and S155C to the main part 27 side of a game machine, and, therefore, the posture of the operating set 120 for game machines is judged on the microcomputer (CPU) by the side of the main part 27 of a game machine concerned. Before transmitting each oscillating data DX, DY, and DZ of the control data (drawing 54) which this transmits to the operating set 120 for game machines from the main part 27 of a game machine, it is good as for a method of an amendment beforehand.

[0204] Moreover, angular-velocity detecting-signal S155A from the angular-velocity sensor 155 formed in the operating set 120 for game machines in the gestalt of the 3rd operation of a ****, S155B and S155C -- being based -- vibration, although the drive current value added to each coils 1443A-143F of a member 140 was described about the amendment case this invention not only in this For example, angular-velocity detecting-signal S155A from the angular-velocity sensor 155, Based on S155B and S155C, the posture of the operating set 120 for game machines is judged, change of the posture concerned is replaced with a user's operation button input, and you may make it transmit to the main part 27 of a game machine.

[0205] If it does in this way, command input of a user only changing the posture of the operating set 120 for game machines, for example, moving the target of operation on monitor display towards desired, without operating the operation button of the operating set 120 for game machines, can be performed.

[0206] (4) Although the case where the power supply which drives the response means 21 (51, 70, 75, 85,130) was supplied from the main part 27 of a game machine in the form of the form (4-1) above-mentioned 1st of other operations, the 2nd, and the 3rd operation was described You may make it this invention prepare the power supply which drives the response means 21 (51, 70, 75, 85,130) in the operating-set 1 (50, 120, 160, 170, 180, 190) side for game machines, as shown not only in this but in drawing 57 .

[0207] In this case, what is necessary is for operation of the operating set 1 (50, 120, 160, 170, 180, 190) for game machines to form the power supply section 95 for the object for motors, or coils in the position close to the place 20 which does not become inconvenient, for example, the connector linked to the main part 27 of a game machine, to exchange inside, and just to make it equipped with the free battery 96, for example, a dry cell, as shown in drawing 57 . It becomes unnecessary to supply a power supply from the main part 27 of a game machine, and what is necessary will be to change only the cable which composition equivalent to the former is sufficient as the main part 27 of a game machine, and is connected by considering as such composition.

[0208] (4-2) Although the case where presence was therefore given to a user was stated to making the operating set 1 (50, 120, 160, 170, 180, 190) for game machines generate vibration in the form of the above-mentioned 1st, the 2nd, and the 3rd operation this invention not only in this For example, the space by the side of the front part of the start selection section 6 in which the operating set 100 for game machines was narrow as shown in drawing 58 , Or the voice generating section 101 which is a response means is formed in the space of the 1st operation supporter 4 gripped and supported in the left palm, or the 2nd operation supporter 5 gripped and supported in the right palm, and you may make it generate especially heavy low-pitched sound.

[0209] If it is made such composition and it will be made into heavy low-pitched sound while being able to obtain the feedback from the main part 27 of a game machine as somesthesia by the sound in a hand, vibration can also be generated simultaneously and presence can be raised by sound and vibration.

[0210] (4-3) Although the case where presence was therefore given to a user was stated to making the operating set 1 (50, 120, 160, 170, 180, 190) for game machines generate vibration in the form of the above-mentioned 1st, the 2nd, and the 3rd operation. You may make it this invention equip the upper surface front position of the start selection section 6 where the operating set 105 for game machines was narrow, as shown in drawing 59, not only this but the member 106 which emits light as a response means, for example, Light Emitting Diode. In this case, in drawing 59, although it has structure which prepared one Light Emitting Diode, some may be arranged not only in one piece but in a single tier, and it is good also as a blink state.

[0211] Thus, by preparing the member (106) which emits light as a response means, when a target of operation hits, the presence of having also hit the operating-set 105 side for game machines, when a hand shone can be obtained.

[0212] In the operating set which the user who performs a game in short has in a direct hand, without in addition being limited to the form of the operation which gave [above-mentioned] explanation and which ***** (4-4) When a target of operation hits, it being applicable to all the composition incorporating a certain member which answers is not saying, and it cannot be overemphasized that sound or light may be suitably combined for dynamic transfer of the form of the above-mentioned implementation. Furthermore, although the case where the operating set for game machines performed a certain response according to the game developed on the screen of a monitor in the form of above-mentioned operation was described, this invention can apply this invention also in a game machine with which not only this but a user therefore carries out false experience only to voice.

[0213]

[Effect of the Invention] according to this invention as mentioned above -- change of the target of operation on a game -- a visual sense -- and -- or the thing felt by the acoustic sense -- in addition, by having prepared the feedback response means in the operating set itself synchronizing with change of a target of operation, the somesthesia of the operating set itself having generated vibration etc. and it having hit to the user can be given, and the game which has presence more can be performed

[0214] Moreover, various control data can be transmitted to the singular number or two or more response meanses by having two or more identification code fields which specify a response means, and control data fields to the response means therefore specified to be the identification code concerned as dynamic transfer data transmitted to the operating set for game machines from the main part of a game machine.

[Translation done.]

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

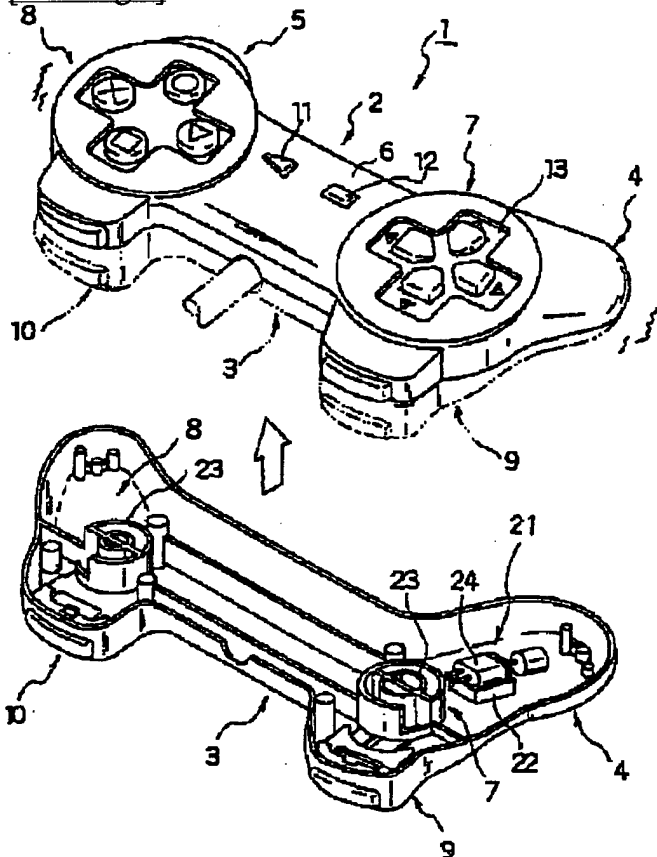


図1 第1の実施の形態の構成

[Drawing 2]

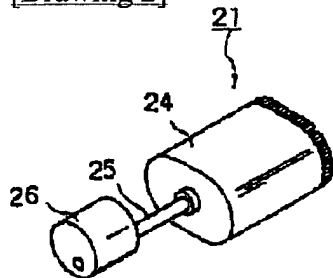


図2 モータ及び重り

[Drawing 3]

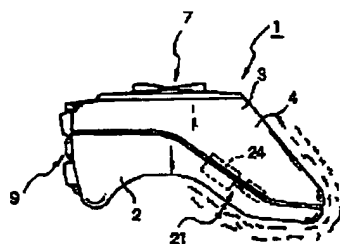


図3 支持部の概略

[Drawing 4]

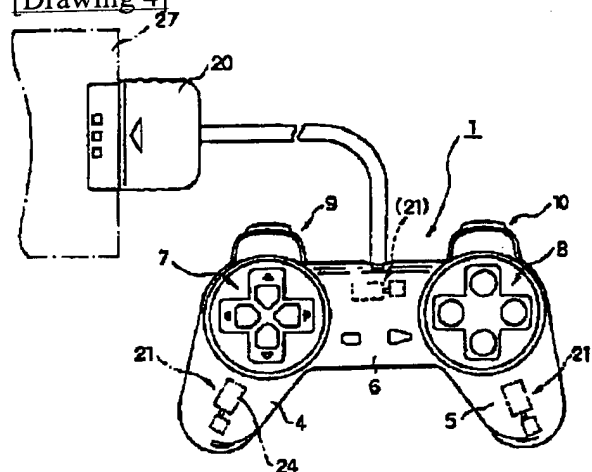


図4 応答手段の配置

[Drawing 11]

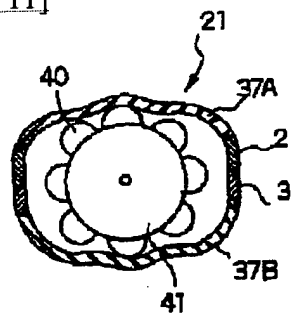


図11 他の実施の形態による操作支持部のA-A断面

[Drawing 5]

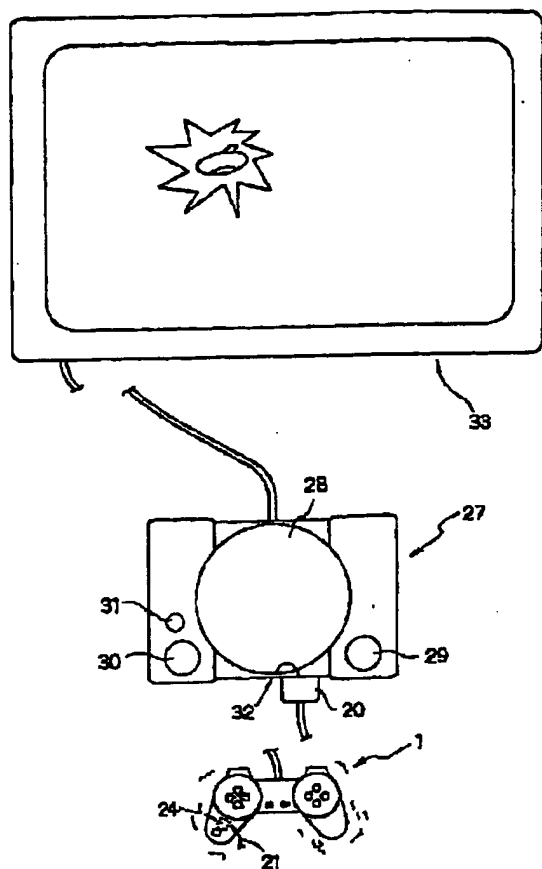


図5 ゲーム機の操作状態

[Drawing 6]

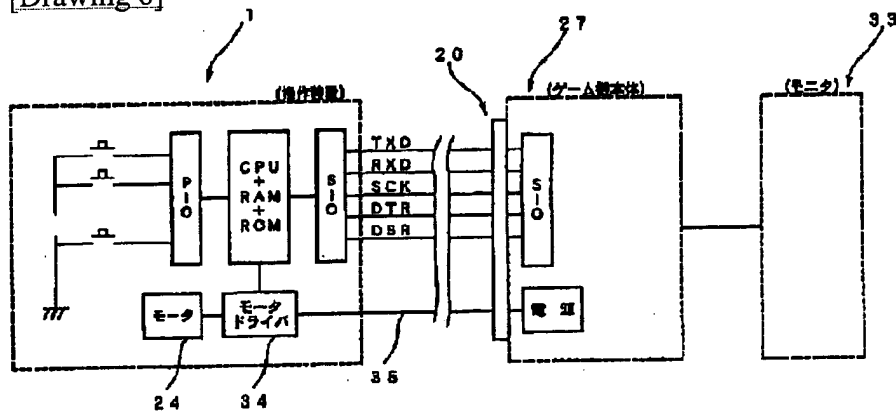


図6 ゲーム機及び操作装置の接続

[Drawing 7]

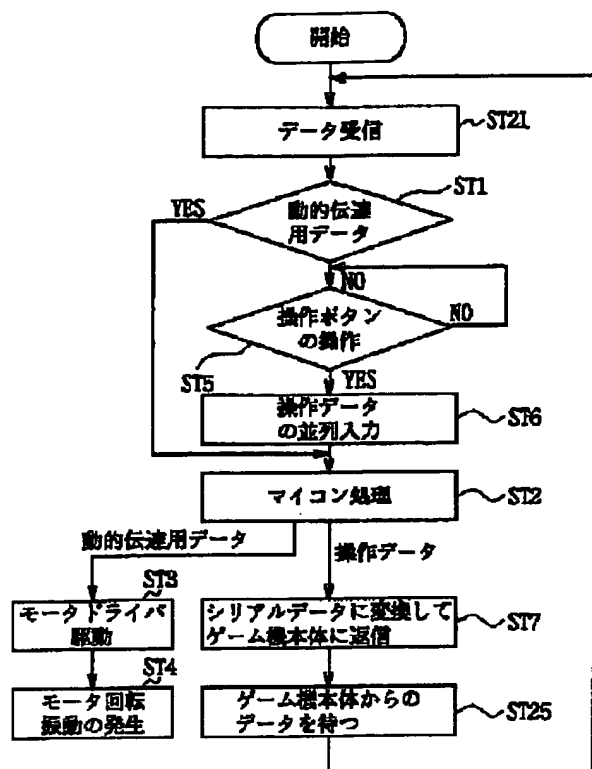


図7 操作装置側の処理手順

[Drawing 8]

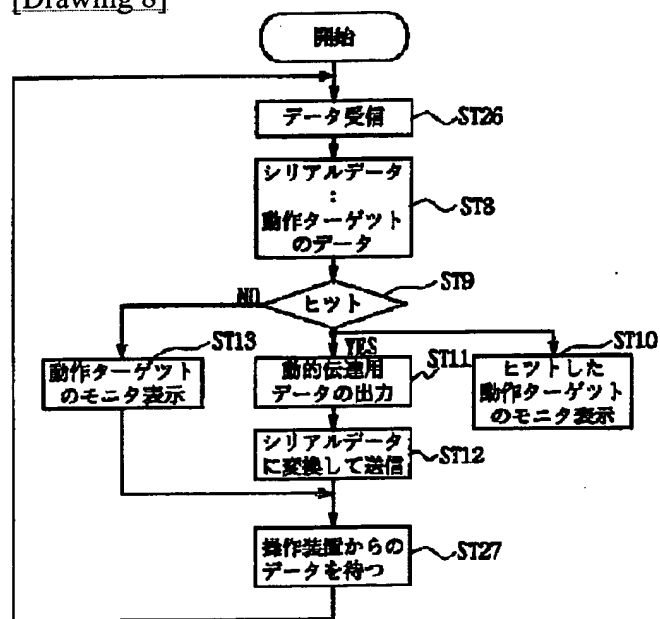


図8 ゲーム機体側の処理手順

[Drawing 9]

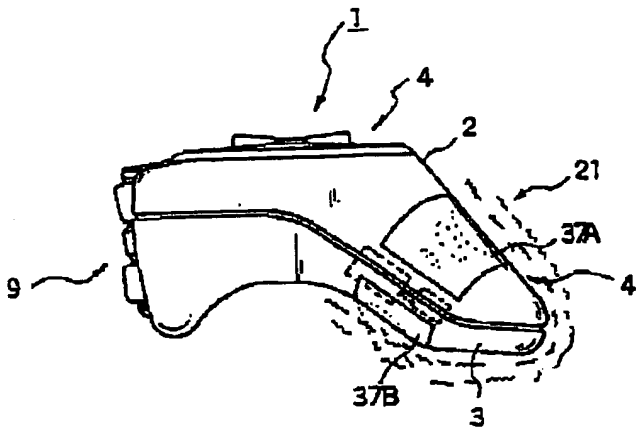


図9 他の実施の形態による操作支持部の振動

[Drawing 10]

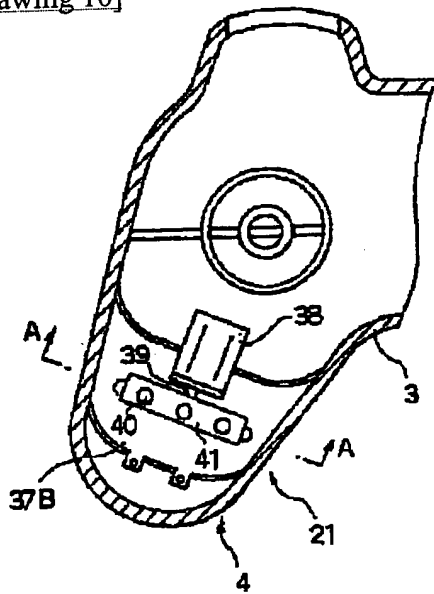


図10 他の実施の形態による操作支持部の内部構成

[Drawing 12]

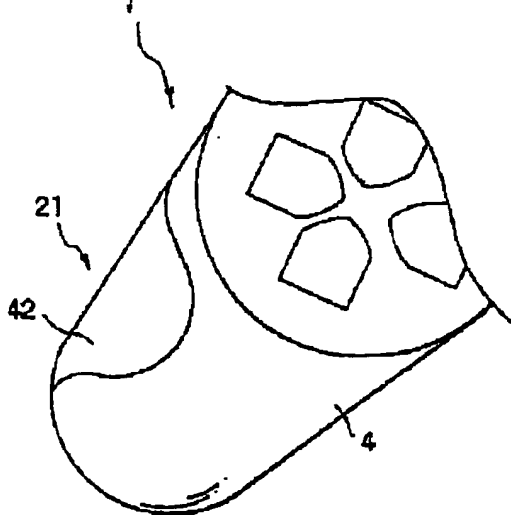


図12 他の実施の形態による操作支持部

[Drawing 13]

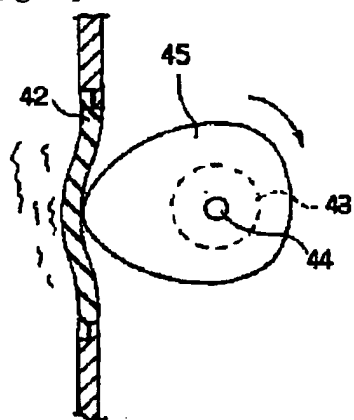


図13 他の実施の形態による応答手段の構成

[Drawing 14]

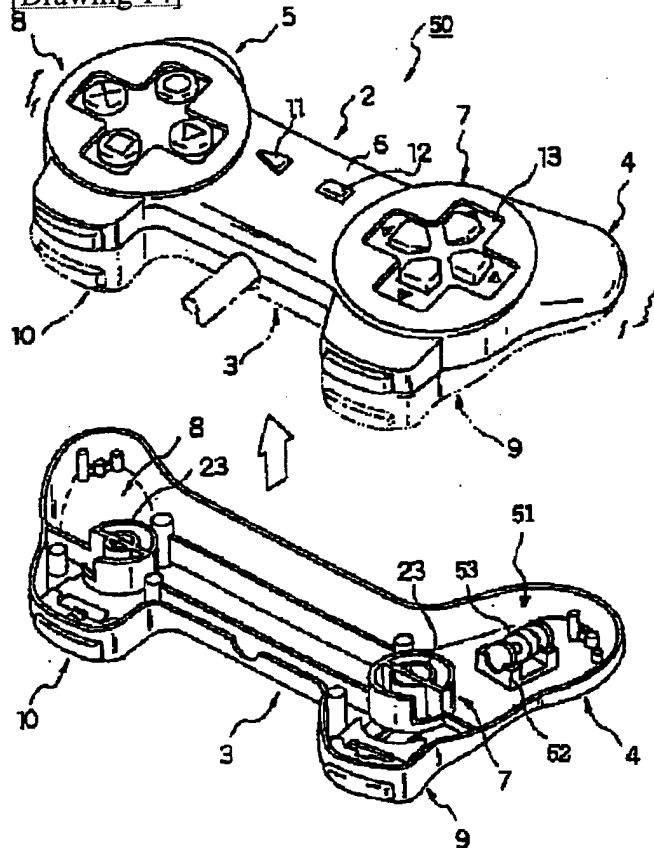


図14 第2の実施の形態の構成

[Drawing 15]

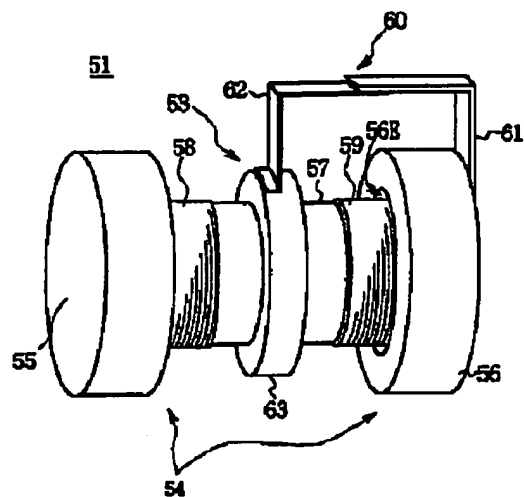


図 1 5 第 2 の実施の形態による応答手段の構成

[Drawing 16]

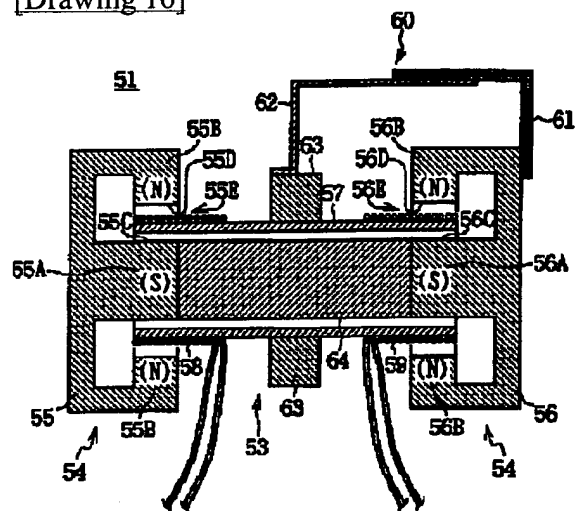


図 1 6 第 2 の実施の形態による応答手段の内部構成

[Drawing 17]

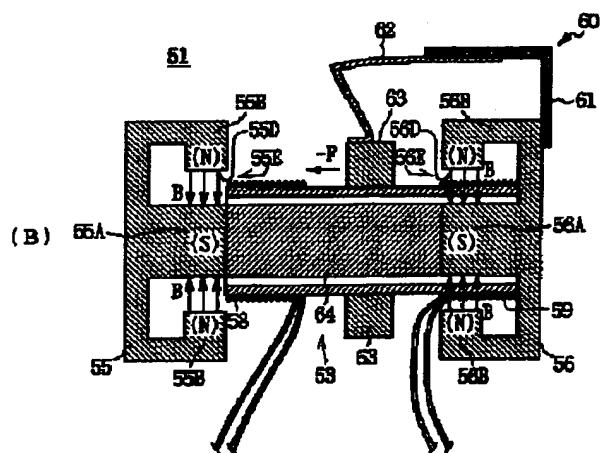
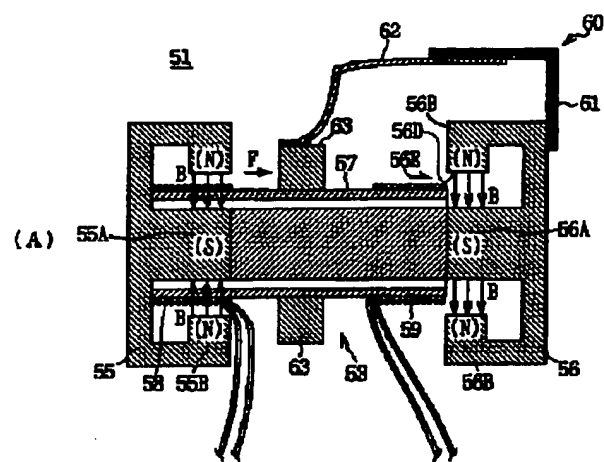


図 17 振動子の動作状態

[Drawing 18]

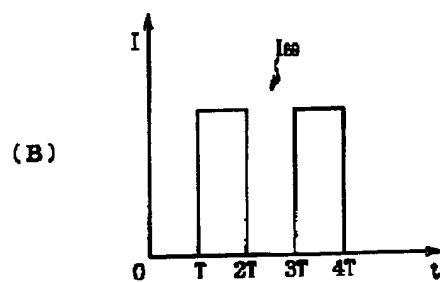
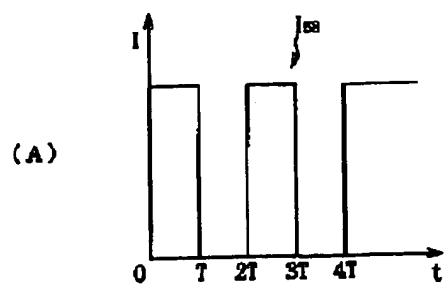


図 18 振動子の駆動電流波形

[Drawing 19]

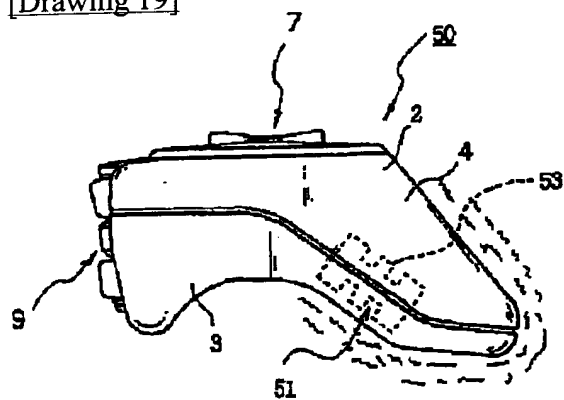


図 19 振動子の振動による操作装置の振動

[Drawing 20]

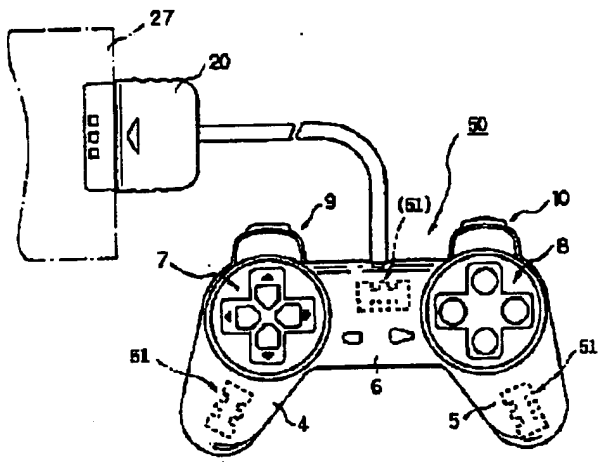


図20 応答手段の配置

[Drawing 21]

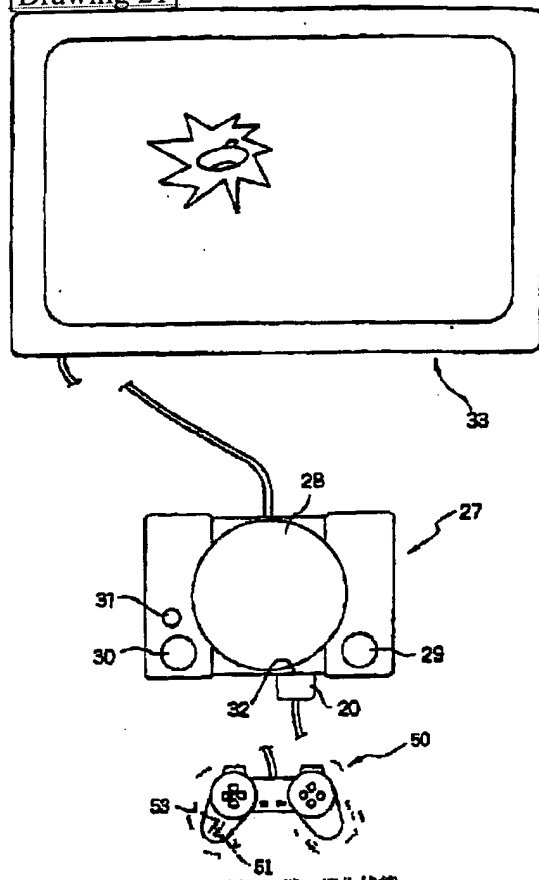


図21 ゲーム機の操作状態

[Drawing 22]

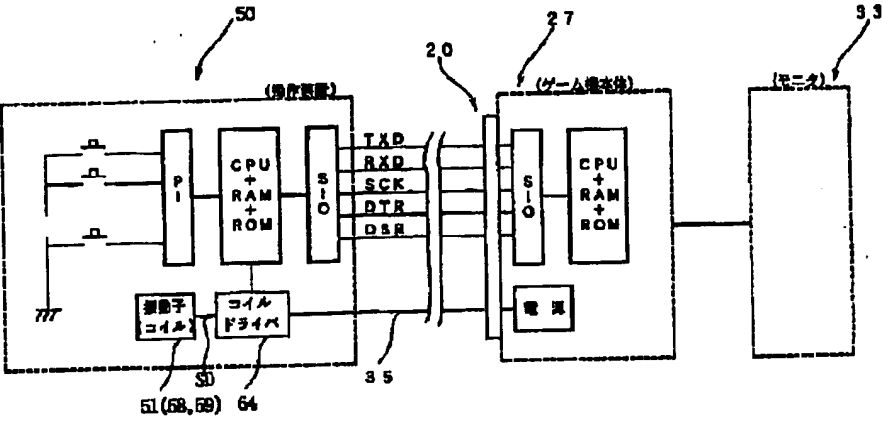


図 2 2 ゲーム機本体及び操作装置の概観

[Drawing 23]

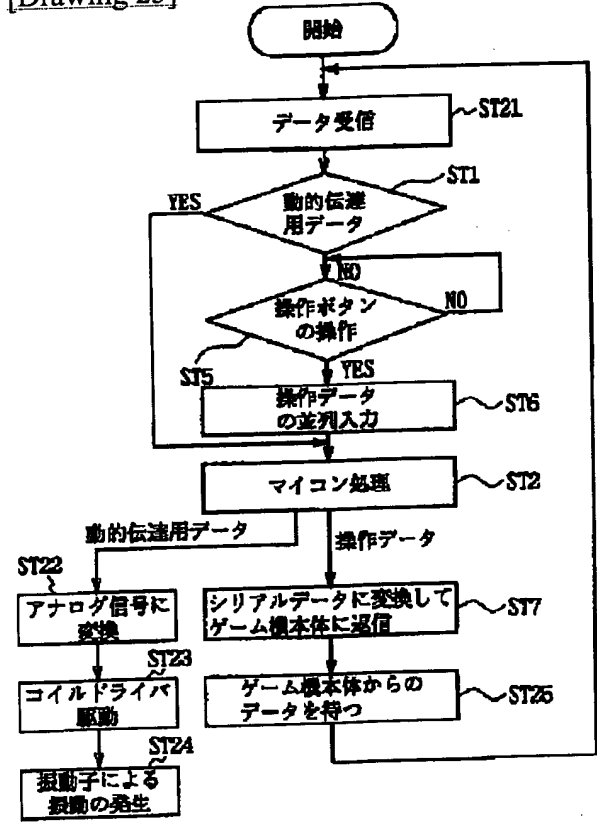


図 2 3 操作装置側の処理手順

[Drawing 26]

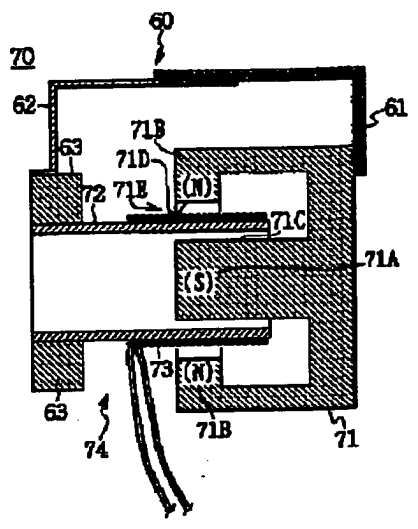


図26 応答手段の他の実施の形態

[Drawing 24]

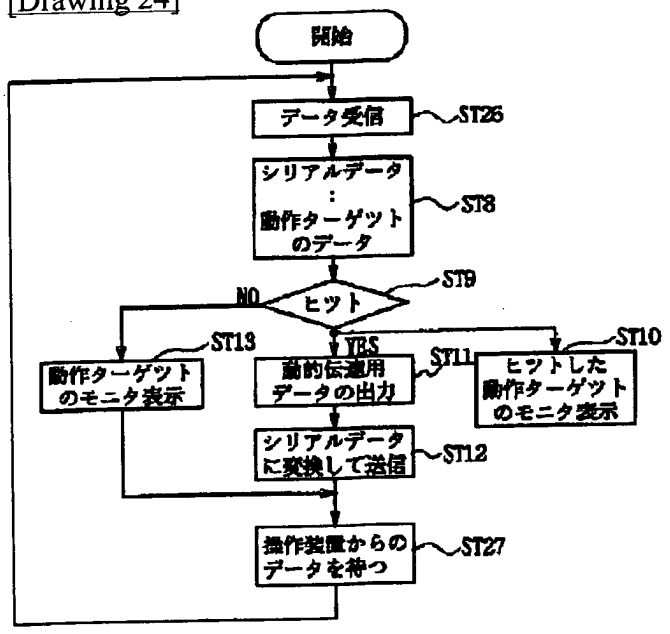


図24 ゲーム機体側の処理手順

[Drawing 25]

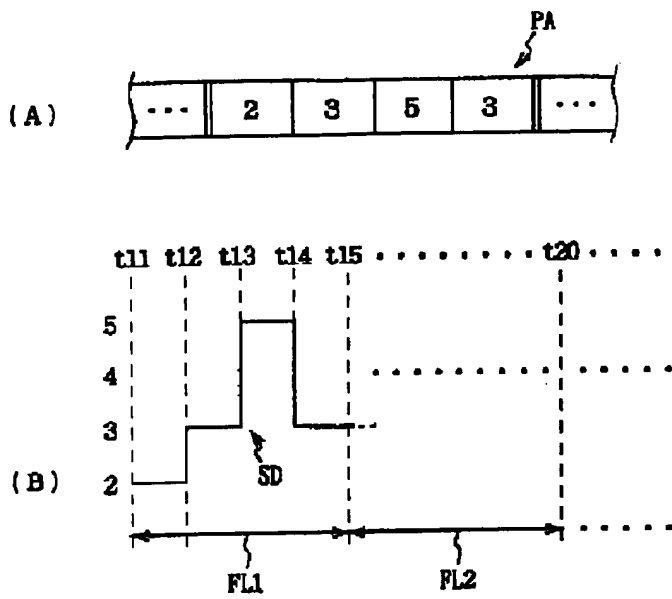


図 25 コイルの駆動信号

[Drawing 27]

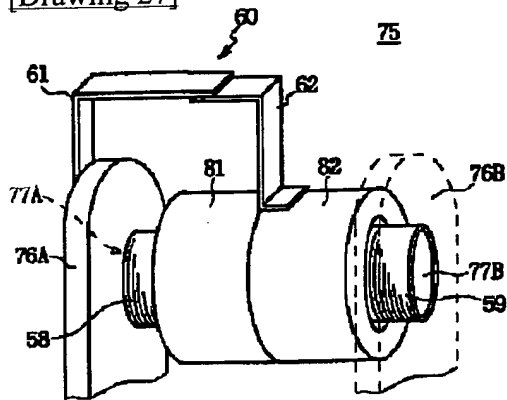


図 27 応答手段の他の実施の形態

[Drawing 28]

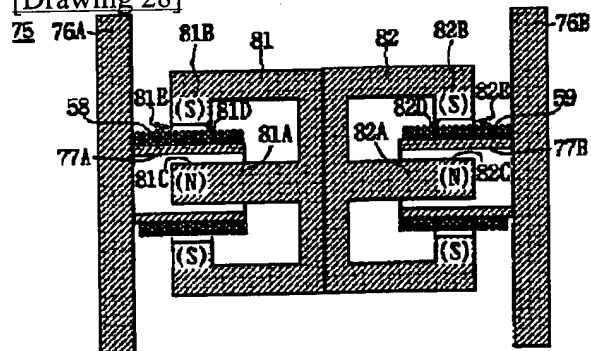


図 28 応答手段の他の実施の形態

[Drawing 33]

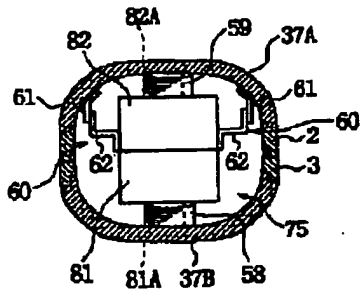


図 3 3 他の実施の形態による操作支持部の A - A 断面

[Drawing 29]

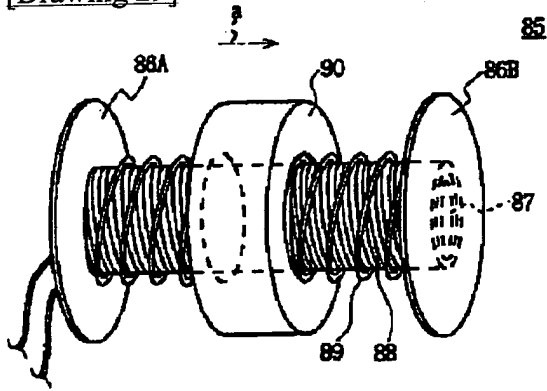


図 2 9 応答手段の他の実施の形態

[Drawing 30]

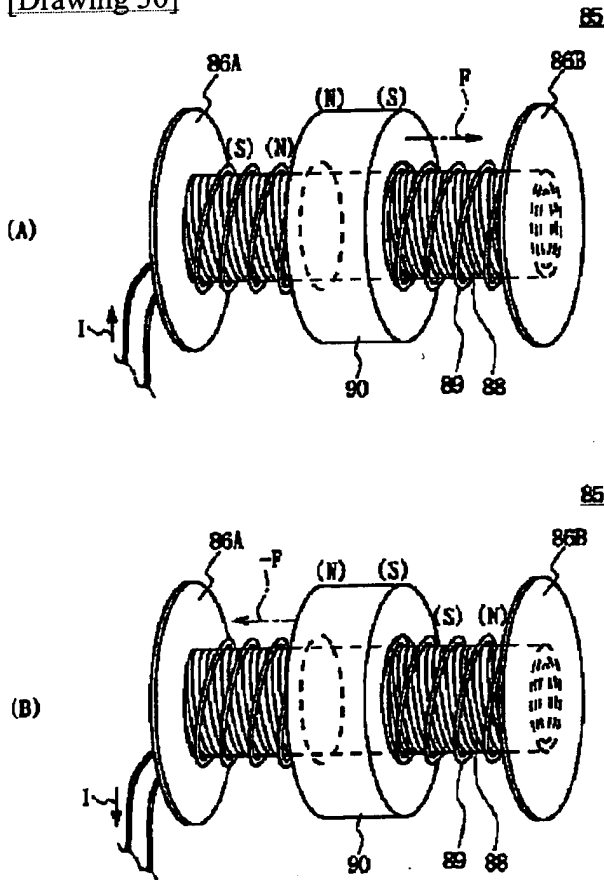


図 3 0 他の実施の形態の動作

[Drawing 31]

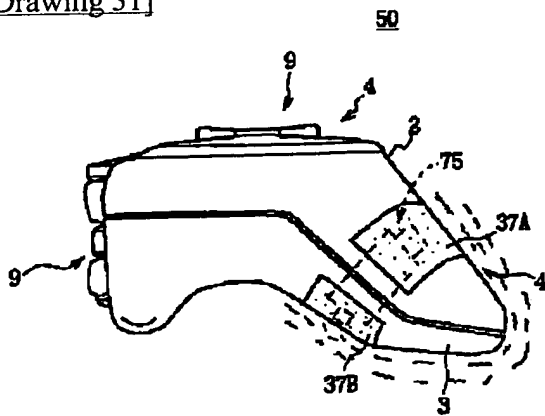


図31 他の実施の形態による操作支持部の振動

[Drawing 32]

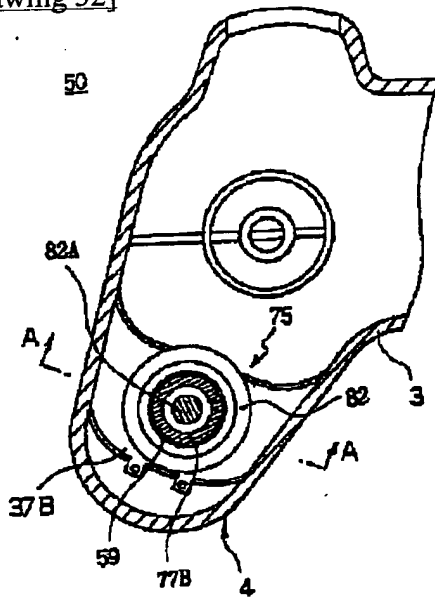


図32 他の実施の形態による操作支持部の内部構成

[Drawing 34]

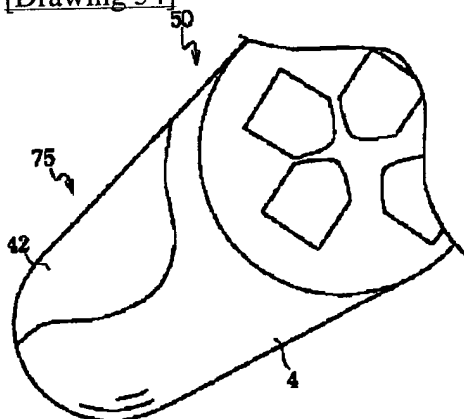


図34 他の実施の形態による操作支持部

[Drawing 35]

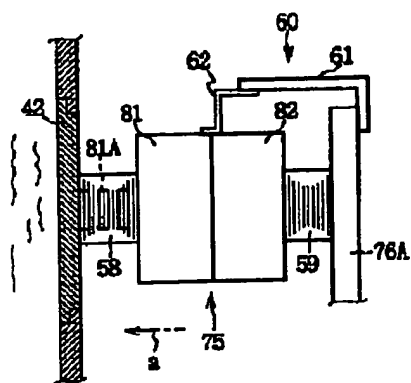


図35 他の実施の形態による振動部の構成

[Drawing 36]

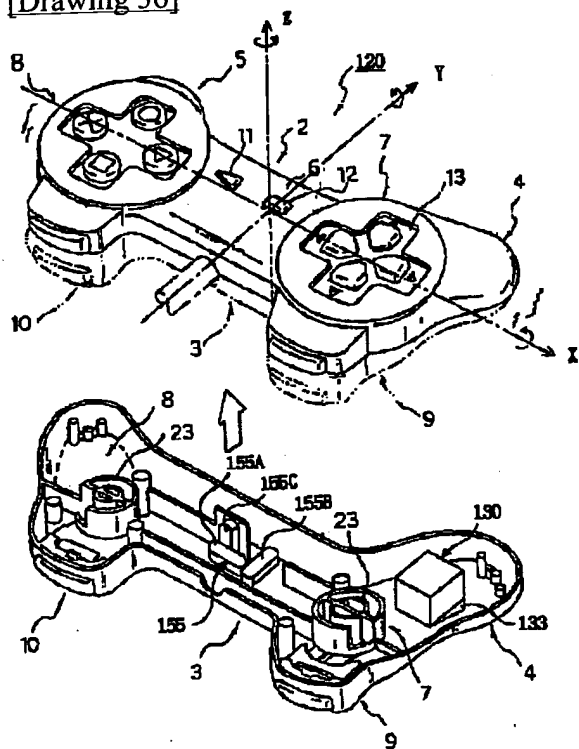


図36 第3の実施の形態の構成

[Drawing 37]

130 応答手段

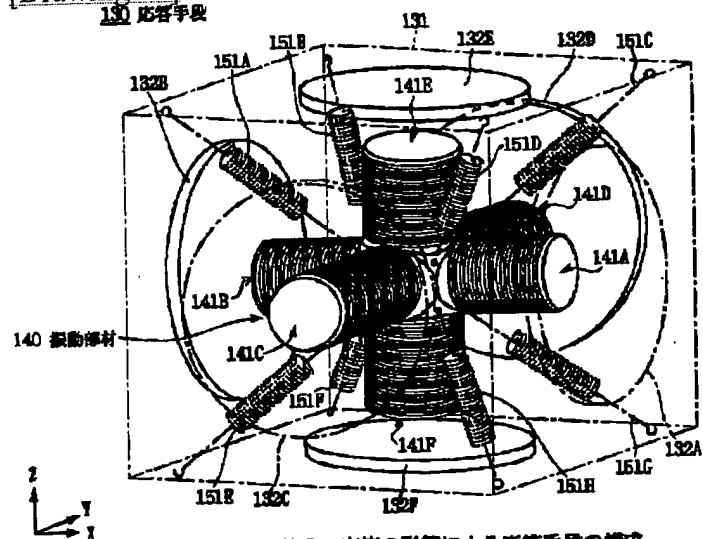


図37 第3の実施の形態による応答手段の構成

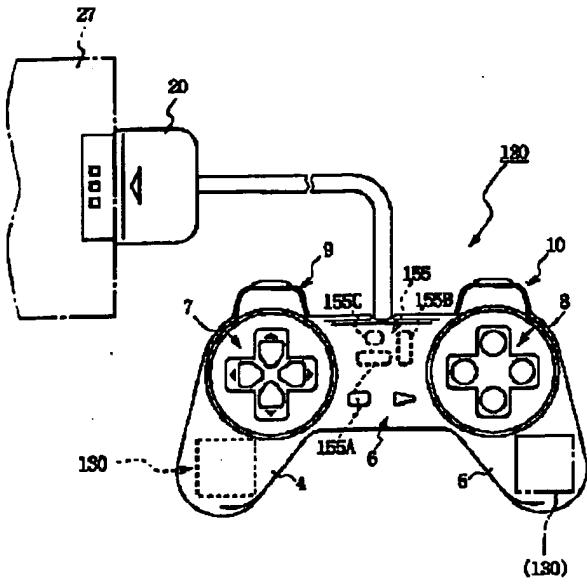


図40 応答手段の配置

[Drawing 41]

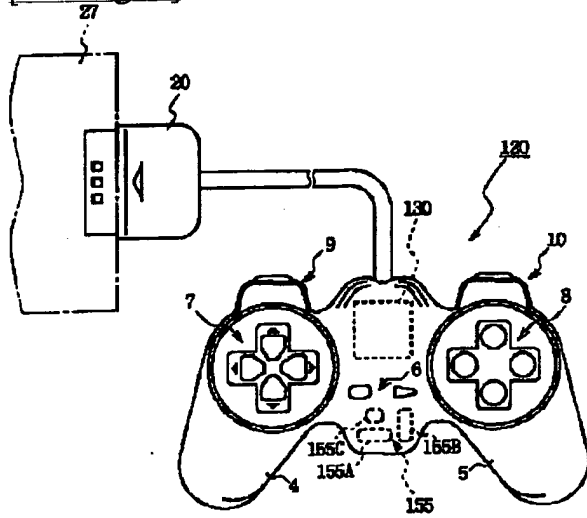


図41 応答手段の配置

[Drawing 42]

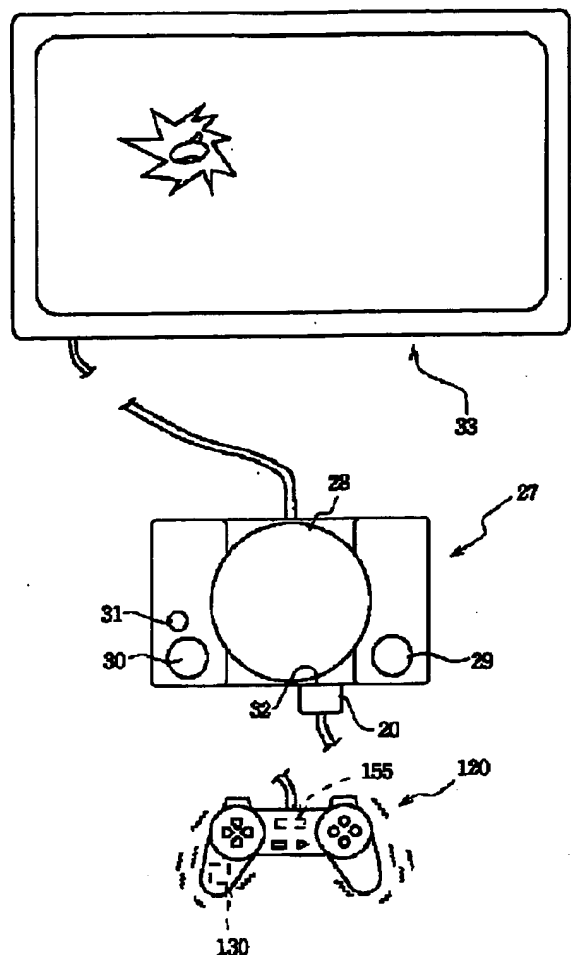


図42 ゲーム機の操作状態

[Drawing 43]

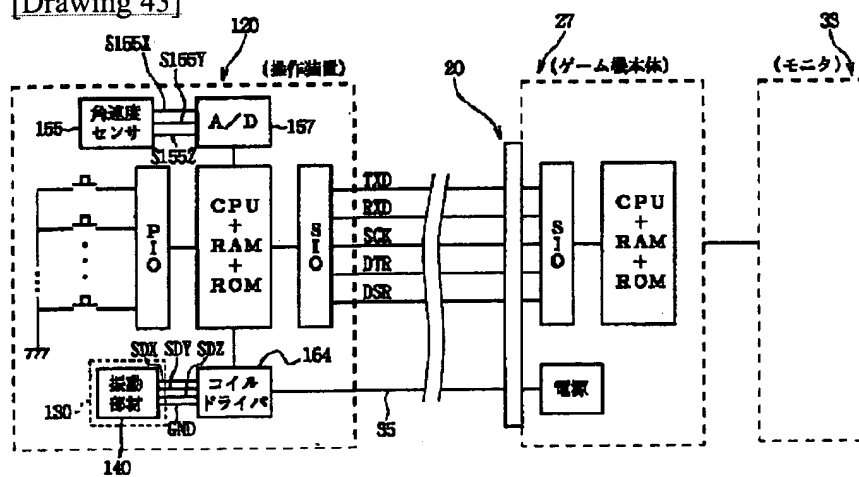


図43 ゲーム機本体及び操作装置の接続

[Drawing 44]

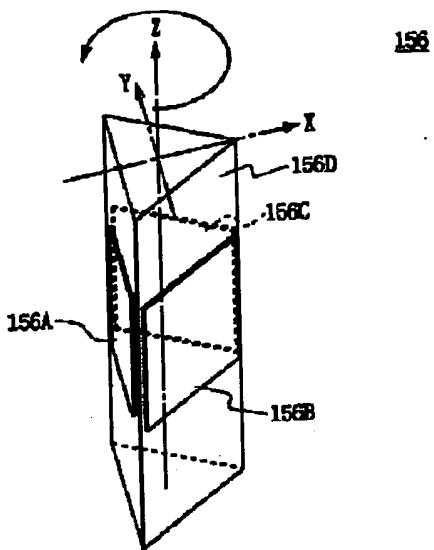


図4.4 角速度センサの構成

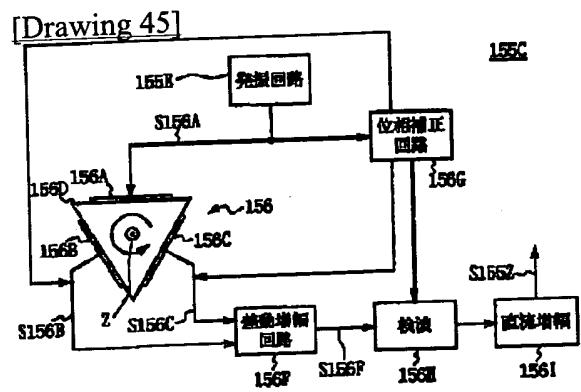


図4.5 Z軸角速度センサ部

[Drawing 47]

1バイト目	プロトコル識別子 (0x01)			
2バイト目	プロトコル識別子 (0x42)			
3バイト目	不定			
4バイト目 (TID1)	0	1	(Dcom)	(DX)
6バイト目 (TID2)	(DY)	(DZ)		

図4.7 シリアル通信データ

[Drawing 48]

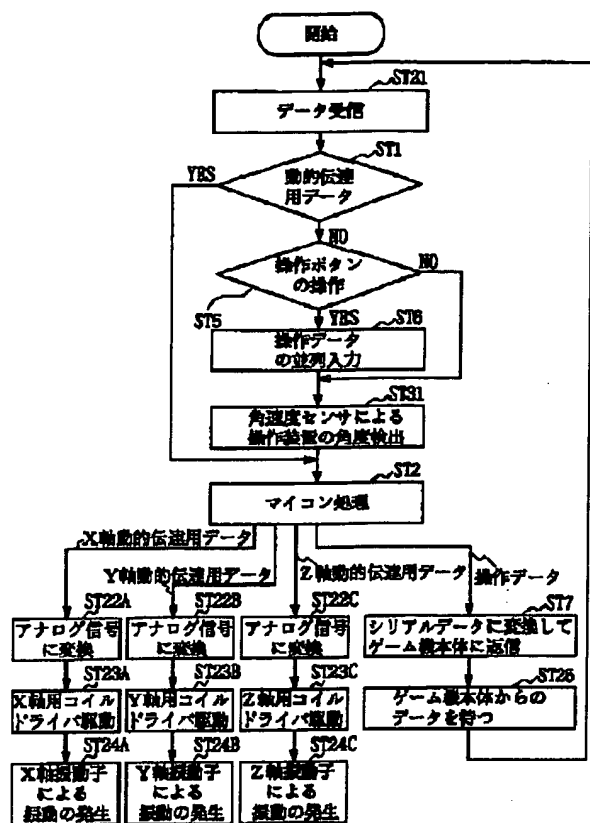


図 48 操作装置側の処理手順

[Drawing 49]

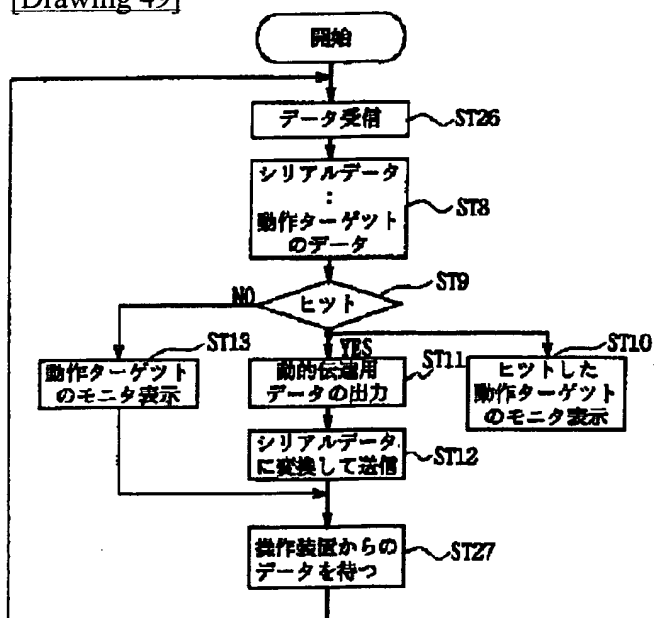


図 49 ゲーム機体側の処理手順

[Drawing 50]

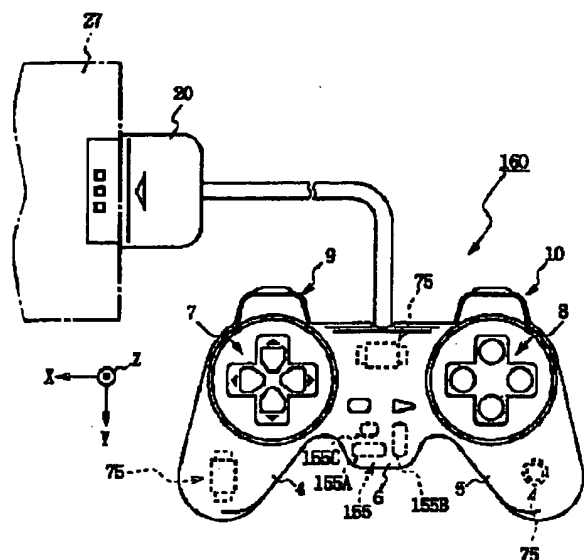


図50 独立した応答手段の配置例

[Drawing 51]

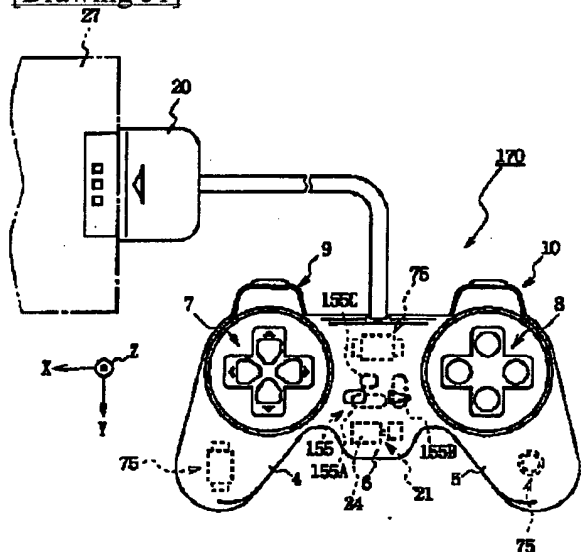


図51 ボイスコイル及びモータの併用(1)

[Drawing 52]

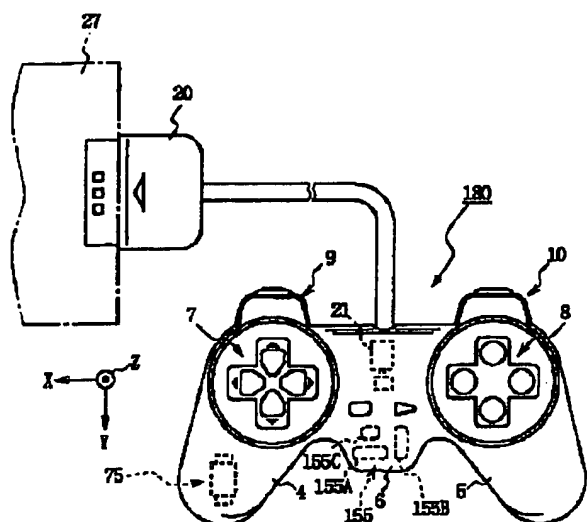


図52 ボイスコイル及びモータの併用(2)

[Drawing 53]

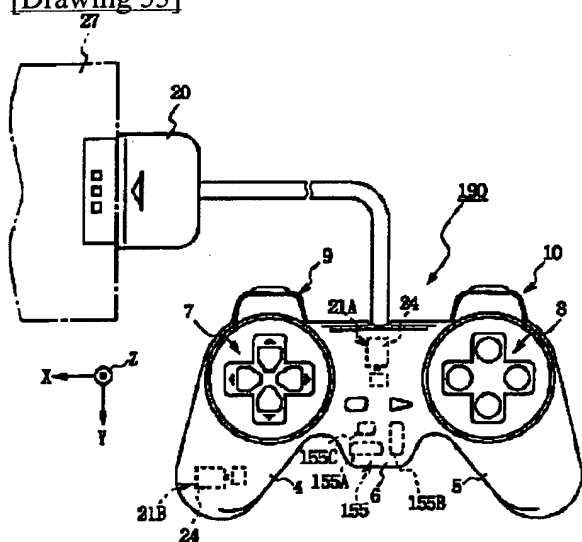


図53 モータを用いた複数の応答手段の配置

[Drawing 54]

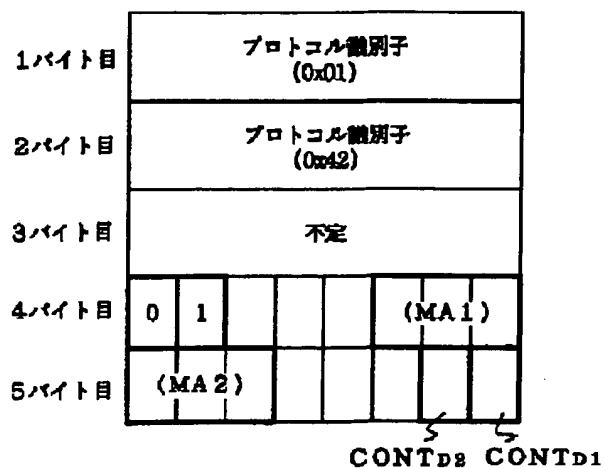


図54 シリアル通信データ

[Drawing 55]

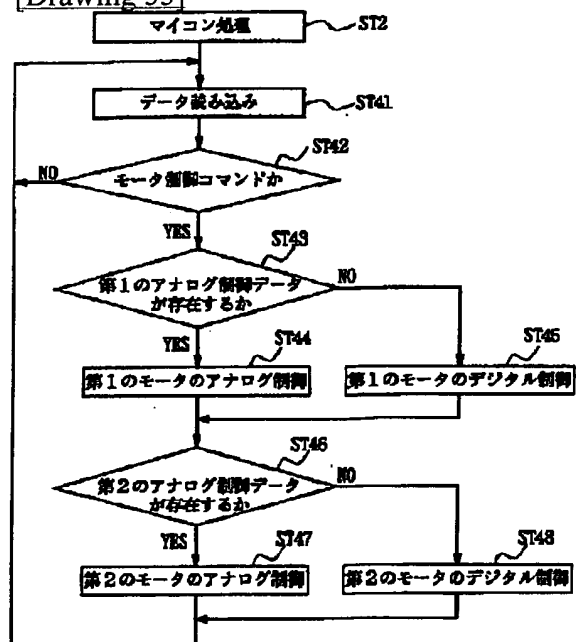


図55 ゲーム機用操作装置のマイコン処理

[Drawing 56]

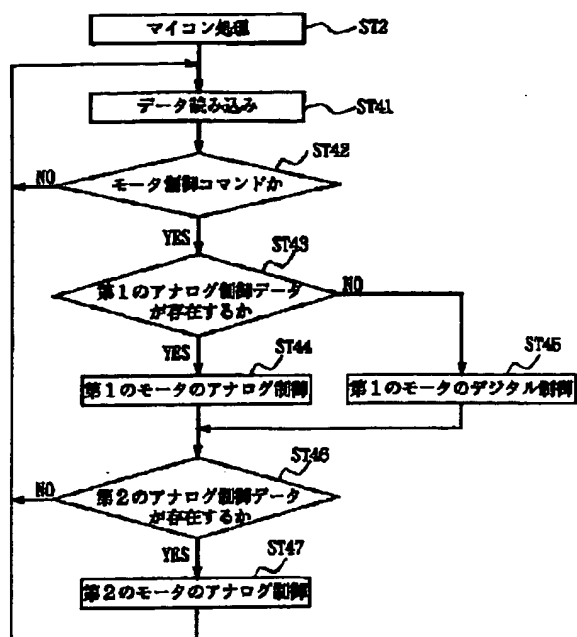


図56 マイコン処理の他の実施の形態

[Drawing 57]

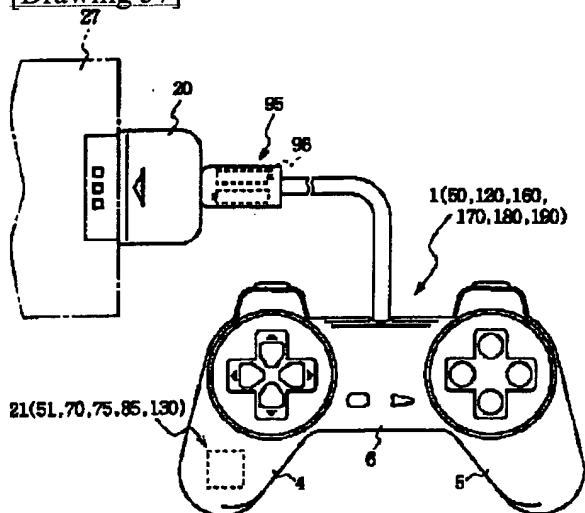


図57 応答手段用電源部の他の実施の形態

[Drawing 58]

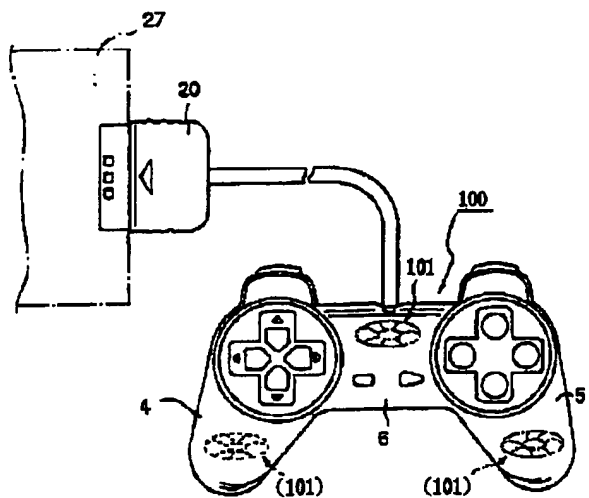


図 58 他の実施の形態による音声発生部を有する操作装置

[Drawing 59]

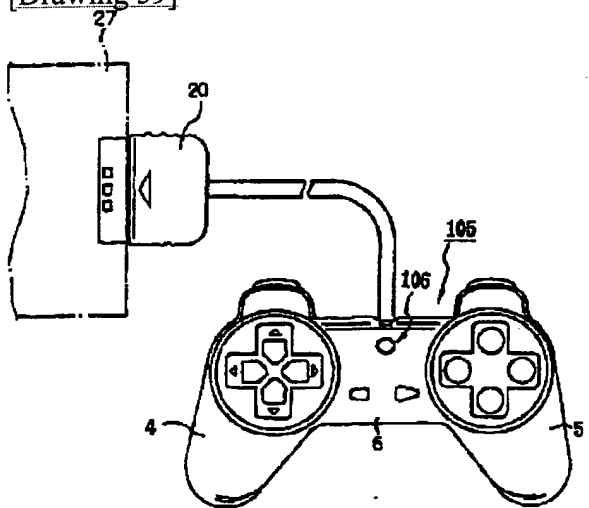


図 59 他の実施の形態による発光部を有する操作装置

[Drawing 60]

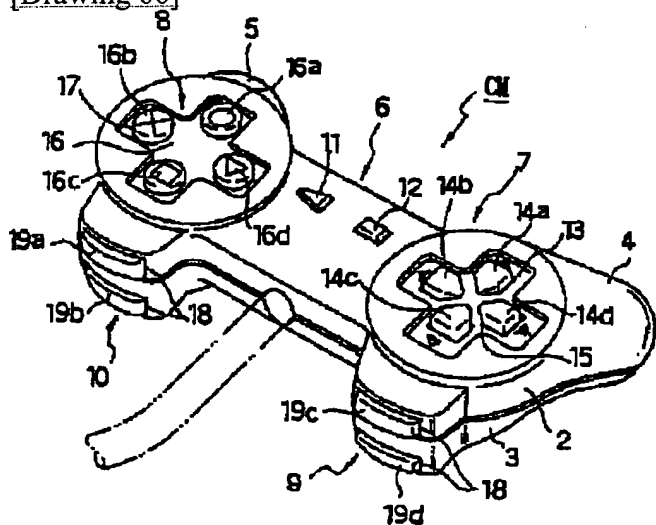


図 60 従来例

[Translation done.]

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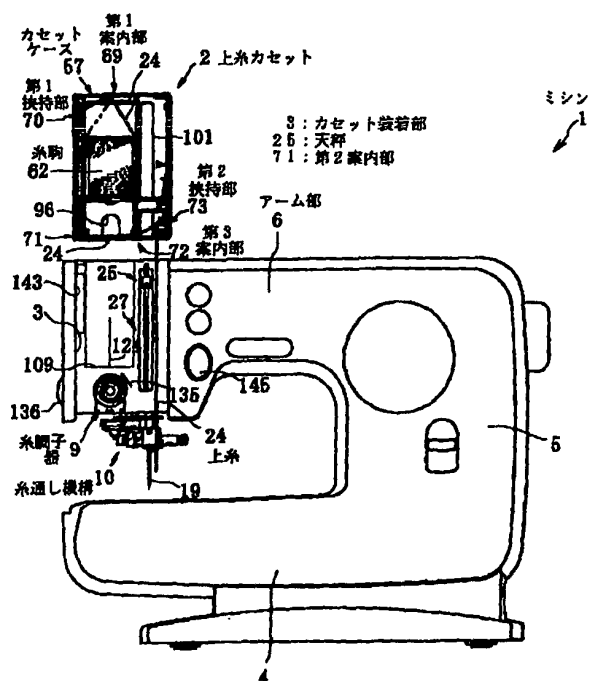
JA07 JA17 QA06

(54) 【発明の名称】 ミシン

(57) 【要約】

【課題】 針の針穴に上糸を糸通しする自動糸通し機構は手動操作式のレバーを操作して作動させる構成であるため、その他の機構と連動して糸通しするのに適しておらず、上糸カセットの装着時に天秤の糸掛け部や糸調子器への糸掛けと連動して糸通しすることはできない。

【解決手段】 ミシンのアーム頭部に天秤移動領域を含むカセット装着部3を縦溝状に形成し、このカセット装着部3に糸駒62を縦向きに収容した上糸カセット2を着脱可能に構成し、アーム頭部に糸通し機構10を設け、上糸カセット2の装着動作に連動させて天秤25の糸掛け部と糸調子器9に糸掛けするとともに、糸通し機構10により針穴19aに糸通しする。



【特許請求の範囲】

【請求項1】 針の運動に調時して往復運動することにより糸駒から繰り出された上糸を取り上げる天秤と、針穴に上糸を通す自動糸通し機構とを備えたマシンにおいて、

マシンのアーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、

前記可動操作体を前記所定範囲内で移動させることにより、上糸を操作して天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするマシン。

【請求項2】 前記可動操作体は、上糸を天秤の糸掛け部に糸掛けする際にその上糸を操作する上糸操作部と、上糸を針穴に糸通しする際に前記自動糸通し機構を作動させる糸通し作動部を備えたことを特徴とする請求項1に記載のマシン。

【請求項3】 前記マシンのアーム部の前部又は前面部に、前記可動操作体を着脱可能に装着する為の操作体装着部を形成したことを特徴とする請求項1又は2に記載のマシン。

【請求項4】 前記可動操作体は、糸駒を収容しかつその糸駒から繰り出された上糸を天秤側に供給する上糸カセットであることを特徴とする請求項1～3の何れかに記載のマシン。

【請求項5】 前記マシンのアーム部の前面部に、前記操作体装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したことを特徴とする請求項4に記載のマシン。

【請求項6】 前記カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設けると共に、カセット装着部の他の一部に突出する糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とする請求項5に記載のマシン。

【請求項7】 前記カセット装着部に突出するように糸調子皿と糸調子パネとを含む糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子パネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とする請求項6に記載のマシン。

【請求項8】 前記上糸カセットをカセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したことを特徴とする請求項5～8の何れかに記載のマシン。

【請求項9】 前記可動操作体の作動を自動糸通し機構

に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられていることを特徴とする請求項1～8の何れかに記載のマシン。

【請求項10】 少なくとも針棒の作動位置を検出する検出手段を有し、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、前記可動操作体を移動可能に構成したことを特徴とする請求項1～9の何れかに記載のマシン。

【発明の詳細な説明】**【0001】**

【発明の属する技術分野】 本発明は、アーム部に少なくとも所定範囲内で移動可能な可動操作体を備えたマシンに関するものである。

【0002】

【従来の技術】 通常のマシンにおいては、アーム部に主軸で駆動される天秤機構や針棒駆動機構が配設され、天秤はアーム頭部の縦スリットから部分的に突出し上下に往復駆動される。アーム部の上端側に糸駒装着部が設けられ、アーム部の前面側に糸調子器と糸調子パネが配設され、この糸調子器の付近に糸調子器の調節ダイヤルが設けられている。針棒はアーム頭部の下方へ突出して、この針棒の下端部に針が取付けられ、縫製対象の生地を押える押え足とこの押え足を支持する押え棒は、押え上げレバーにより生地を押える下降位置と上方へ退避させた退避位置とに切換え可能である。

【0003】 縫製を停止して上糸の糸駒を交換する場合、押え足は退避位置にあり、糸調子器が開放状態になっている。その状態で糸駒を交換し、この糸駒から繰り出した上糸を複数の糸案内部を経て糸調子器に導き、開放状態の1対の糸調子皿の間と糸調子パネとに糸掛けし、天秤の糸掛け部に糸掛けし、その後針の針穴に上糸の端部を糸通しする。このように、上糸の糸駒を交換するには糸調子器、糸調子パネ、天秤の糸掛け部に糸掛けを行い、針穴に糸通しを行なう必要がある。

【0004】 そこで、米国特許第3,749,039号公報には、上糸カセットをアーム部に着脱可能に構成し、糸掛けを簡単に行えるようにした技術が記載されている。このマシンのアーム部の左右方向ほぼ中央部にはカセット装着部が設けられ、このカセット装着部に上方から上糸カセットを着脱可能になっている。前記カセット装着部は、天秤機構の天秤が上下に往復移動する天秤移動空間の右側に形成され、天秤の先端側部分はカセット装着部の左端部に突入して上下に往復移動する。

【0005】 前記上糸カセットは、正面視ほぼ台形をなすカセットケースを有し、このカセットケースはケース本体と開閉蓋からなる。カセットケース内の上部の糸駒収容部には糸駒がその軸心を水平にして収容され、この糸駒の上糸は右方へ所定長さほぼ水平に繰り出される。カセットケースの中央部の下部には糸調子器を突入させ

る為の第1切欠き部が形成され、カセットケースの左端部の下部には天秤を導入する為の第2切欠き部が形成されている。

【0006】糸駒から繰り出された上糸を案内する5つの糸案内が設けられている。第1糸案内はカセットの右端部の上部に設けられ、第2、第3糸案内は第1切欠き部を挟む位置に設けられ、第4、第5糸案内は第2切欠き部を挟む位置に設けられている。第1糸案内には、上糸カセットをカセット装着部に装着しない状態で上糸に抵抗を付与し且つカセット装着後には開放する第1抵抗付与部が設けられている。第5糸案内には、カセット未装着の状態で上糸に抵抗を付与し且つカセット装着後には開放する第2抵抗付与部が設けられている。この第2抵抗付与部では第1抵抗付与部よりも強い抵抗を付与するようになっている。

【0007】アーム部に設けたカセット装着部の左端部分には、上糸カセットを装着する際に上糸を案内して天秤の糸掛け部に案内する糸案内内部材が設けられている。この糸案内内部材は左右1対のアーム板とウェブとを一体形成したもので、1対のアーム板の後端には上糸を案内する案内面が形成され、これらアーム板には天秤の糸掛け部に対応するノッチ（切欠き部）が形成されている。また、上糸カセットとカセット装着部には、上糸カセットの装着時に糸調子器の1対の糸調子皿を開いた状態にし、上糸カセットの装着完了後に1対の糸調子皿を閉じようにする機構も設けられている。

【0008】上糸カセットをカセット装着部に装着する場合には、最初に、手動操作で主軸を回転させて天秤を最下位置に移動させる。次に、上糸カセットを上方からカセット装着部に装着していくと、上糸が糸案内内部材で案内されつつ下降し、第2、第3糸案内の間の上糸が糸調子器と糸調子バネに自動的に糸掛けされ、第4、第5糸案内の間の上糸が糸案内内部材の案内面で案内されて天秤の糸掛け部に自動的に糸掛けされ、上糸カセットが装着完了状態になると、第1、第2抵抗付与部が開放状態になり、その後の縫製中には糸駒から上糸が繰り出される。

【0009】一方、特開昭55-81693号公報には、ミシンのカセット式通糸装置が提案されている。このカセット式通糸装置では、アーム部の天秤移動領域とその右側領域に設けたカセット装着部と、このカセット装着部を開閉するカバー体を設け、このカバー体上糸カセットを着脱する。カセット装着部には糸調子器と糸取りバネとが突出し、カセット装着部の左端部には天秤移動空間がある。

【0010】上糸カセットは、糸巻体収容部と、1対の脚部などを有し、糸巻体の中心から繰り出した上糸を1対の脚部の間に延ばして自由スパンを形成する。カバー体を前方へ90度回動させて開き、このカバー体上糸カセットをセットしてから、カバー体を閉じる。天秤を

最下位置にしてカバー体を閉じる閉動作の際、上糸カセットの自由スパンが糸調子器と糸取りバネに自動的に糸掛けされる。その後、天秤を上昇させると、天秤の糸掛け部に自動的に上糸が掛けられる。尚、前記カバー体を閉じた状態では、糸巻の軸心は水平方向且つ前後方向に向いている。

【0011】他方、例えば特開平5-293284号公報に示すように、ミシンのアーム頭部に自動糸通し機構を装備し、その操作レバーを所定距離下方へ移動させることで、針の針穴に上糸の糸端を糸通しするように構成したミシンも実用に供されている。但し、この自動糸通し機構は他の機構や装置と連動する構成ではない。

【0012】

【発明が解決しようとする課題】 前記米国特許公報に記載の上糸カセットを用い、この上糸カセットをカセット装着部に装着しながら、天秤の糸掛け部と糸調子器の1対の糸調子皿及び糸調子バネとに自動的に糸掛けすることができる。しかし、前記公報のミシンでは、自動糸通し機構を装備していないから、上糸カセットの装着と連動して、針穴に上糸の糸端を糸通しすることができない。そのため、天秤の糸掛け部と糸調子器に糸掛けした後、手動操作より針穴に上糸の糸端を糸通しする必要があり、上糸交換の作業能率を高めることが難しい。

【0013】しかも、前記公報のミシンでは、上糸カセットの装着の際、予めミシンの主軸を手動操作することで天秤を最下位置を切換えてから、上糸カセットをカセット装着部に装着するような構成となっているため、天秤を最下位置を切換える操作が煩わしく、作業能率を高めるににくい。

【0014】本発明の目的は、可動操作体の移動に連動して天秤の糸掛け部に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、上糸カセットの装着動作に連動して天秤の糸掛け部に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、上糸カセットの装着操作に連動して天秤の糸掛け部と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、などである。

【0015】

【課題を解決するための手段】 請求項1のミシンは、針の運動に調時して往復運動することにより糸駒から繰り出された上糸を取り上げる天秤と、針穴に上糸を通す自動糸通し機構とを備えたミシンにおいて、ミシンのアーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、前記可動操作体を前記所定範囲内で移動させることにより、上糸を操作して天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。

【0016】可動操作体は、上糸の糸駒を収容した上糸カセットであってもよく、糸駒を収容していない操作具であって上糸カセットと同様に糸掛けする為の操作具であってもよく、或いは、アーム部に所定角度揺動可能に枢着された揺動レバーであって上糸カセットと同様に糸掛けする為の揺動レバーであってもよい。

【0017】可動操作体は、ミシンのアーム部に少なくとも所定範囲内で移動可能に設けられ、この可動操作体を前記所定範囲内で移動させることにより、上糸を天秤の糸掛け部にセットすると共に、自動糸通し機構を作動させて上糸を針穴に糸通しする。このように、可動操作体の移動の動作に連動させて、天秤の糸掛け部に糸掛けしつつ、上糸を針穴に糸通しすることができるため、天秤の糸掛け部への糸掛けと、針穴への糸通しが簡単化し、作業能率を高めることができる。

【0018】請求項2のミシンは、請求項1の発明において、前記可動操作体は、上糸を天秤の糸掛け部に糸掛けする際にその上糸を操作する上糸操作部と、上糸を針穴に糸通しする際に前記自動糸通し機構を作動させる糸通し作動部を備えたことを特徴とするものである。可動操作体を装着しながら、上糸を天秤の糸掛け部に糸掛けする際に可動操作体の上糸操作部が上糸を操作し、上糸を針穴に糸通しする際に可動操作体の糸通し作動部が自動糸通し機構を作動させる。

【0019】請求項3のミシンは、請求項1又は2のミシンにおいて、前記ミシンのアーム部の前部又は前面部に、前記可動操作体を着脱可能に装着する為の操作装着部を形成したことを特徴とするものである。前記操作体装着部がアーム部の前部又は前面部に形成されているため、可動操作体の着脱操作が行い易くなるうえ、アーム部の前面部に位置している天秤の糸掛け部や糸調子器に上糸を掛ける面でも有利である。

【0020】請求項4のミシンは、請求項1～3の何れかの発明において、前記可動操作体は、糸駒を収容しかつその糸駒から繰り出された上糸を天秤側に供給する上糸カセットであることを特徴とするものである。この上糸カセットは、前記アーム部に対して着脱可能なものであり、この上糸カセットには糸駒が収容され、糸駒からの上糸を天秤側へ供給するため、上糸カセットの装着側への操作により天秤の糸掛け部への糸掛けと針穴への糸通しを簡単に行うことができ、上糸カセットを介して上糸を交換できる。

【0021】請求項5のミシンは、請求項4の発明において、前記ミシンのアーム部の前面部に、前記操作装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したことを特徴とするものである。

【0022】操作装着部としてのカセット装着部が、上糸カセットの装着側が開放され且つ上糸カセットの着脱

時に上糸カセットを直線状に案内する溝状に形成されているため、上糸カセットを装着する際には、カセット装着に上糸カセットを装着側から装着して直線的に移動させるという簡単な操作で装着できるし、上糸カセットを取り外す際に直線的に移動させることで取り外すことができる。

【0023】請求項6のミシンは、請求項5の発明において、前記カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設けると共に、カセット装着部の他の一部に突出する糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするため、天秤と糸調子器への糸掛けと、針穴への糸通しを簡単に能率的に行うことができる。

【0024】請求項7のミシンは、請求項6の発明において、前記カセット装着部に突出するように糸調子皿と糸調子バネを含む糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。従って、糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに自動的に糸掛けでき、自動糸通し機構を介して上糸を針穴に自動的に糸通しすることができる。

【0025】請求項8のミシンは、請求項5～8の何れかの発明において、前記上糸カセットをカセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したことを特徴とするものである。上糸カセットをカセット装着部に途中の位置まで装着すれば、上糸カセットから手を離し得る状態になるため、自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させる。

【0026】請求項9のミシンは、請求項1～8の何れかの発明において、前記可動操作体の作動を自動糸通し機構に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられていることを特徴とするものである。そのため、停止状態の針棒の高さ位置に合わせて係合機構を解除作動させることができるから、針棒の高さ位置に応じて針穴の高さ位置がずれていても、確実に糸通しを行ってから解除作動させることができる。

【0027】請求項10のミシンは、請求項1～9の何

れかの発明において、少なくとも針棒の作動位置を検出する検出手段を有し、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、前記可動操作体を移動可能に構成したことを特徴とするものである。針棒が所定位置にある場合には、針穴の高さ位置が一定の高さ位置にあるから、可動操作体を装着して自動糸通し機構を作動させて糸通しするのに適していることに鑑み、針棒が所定位置にある場合に可動操作体を操作体装着部に装着可能にしてある。

【0028】

【発明の実施の形態】 以下、本発明の実施の形態について図面を参照して説明する。この電子制御式ミシンは、アーム頭部のカセット装置部に糸駒を収容した上糸カセットを装着可能に構成し、その上糸カセット2を装着する際の装着動作と連動して、天秤の糸掛け部と糸調子器に糸掛けを行なうと共に針の針穴に糸通しを行うように構成したものである。

【0029】最初に、ミシン1の基本構造、糸通し機構10について順に説明し、その後上糸カセット2、カセット装着部3、天秤機構8、糸通しの為の伝達機構115、糸調子器9の為の連動機構134の順に説明する。

尚、以下の説明は、ミシンを操作する者から見た前後左右を前後左右として説明する。

【0030】図1～図3に示すように、この電子制御式ミシン1は、ベッド部4と、ベッド部4の右端部に立設された脚柱部5と、脚柱部5の上端から左方に延びるアーム部6を有する。アーム部6には、針棒上下動機構7、カセット装着部3、天秤機構8、糸調子器9、自動糸通し機構10が設けられている。尚、カセット装着部3はアーム部6の頭部（アーム頭部）に設けられている。アーム部6内には、主軸11が1対の軸受12を介して回転可能に支持され、主軸11は図示外のミシンモータの駆動力で回転駆動される。

【0031】次に、針棒上下動機構7について説明するが、この機構は一般的な構造のものであるので簡単に説明する。図1、図3～図8に示すように、アーム部6のアーム頭部には、針棒台フレーム13が立向きに配設され、針棒台フレーム13は後壁部14と左壁部15とを有し、後壁部14の下端と上端には前方へ延びる下支持部14aと上支持部14bが夫々一体形成されている。左壁部15の上端部には、上支持部14bよりも上方に延びる枢支腕部15aが形成され、針棒18は上支持部14bと下支持部14aを上下動可能に挿通している。

【0032】枢支腕部15aの上端部には、左右方向向きの軸部材16aが固着され、前面開放状の平面視略コ字形状の枢支金具16が軸部材16aに固定的に連結され、枢支金具16は前後方向向きの水平な支持軸17を介してミシン機枠に揺動可能に支持され、針棒台フレーム13は支持軸17を揺動中心として左右方向（針振り方向）へ揺動可能である。尚、ステッピングモータによ

り針棒台フレーム13を介して針を揺動駆動する機構は一般的なものである所以その説明は省略する。針棒18は上支持部14bと下支持部14aに上下動可能に支持され、針棒18の下端には針19が着脱可能に取付けられている。

【0033】図3、図11～図13に示すように、主軸11の左端側部分には、天秤機構8の天秤クランク20が設けられ、その天秤クランク20にクランクピン21を介して針棒クランク22が回転自在に連結されている。針棒18の略中段部には針棒抱き23が固定され、針棒クランク22が針棒抱き23に連結されている。縫製の際、ミシンモータにより主軸11が回転駆動され、針棒クランク22により針棒18が上下に往復駆動される。

【0034】図11～図15、図17に示すように、アーム部6には、針19の上下運動に調時して上糸24を取り上げる天秤25を備えた天秤機構8が設けられている。天秤25の先端部に上方から糸掛け可能な糸掛け部26が形成され、カセット装着部3の右端側部分の全高に互って、天秤25の糸掛け部26が上下に往復移動可能な天秤移動領域27が設けられている。カセット装着部3の下部に突出するように、上糸に通過抵抗を付与する為の糸調子器9が設けられている。

【0035】この糸調子器9は、押え足28を昇降させる押え上げレバー29により開閉操作可能であり、後述するように、上糸カセット2の装着時にも、糸調子器9が開閉操作される。尚、脚柱部5内にはほぼ立て向きの縦軸が配設され、その縦軸はギヤ機構を介して主軸11に連動連結され、この縦軸の駆動力がベッド部4内の糸捕捉用釜に伝達される。一般的な電子制御ミシンと同様に、針19と糸捕捉用釜とステッピングモータで駆動される布送り機構との協働により加工布30に縫製が施される。

【0036】次に、針19の針穴19aに上糸24を糸通しする自動糸通し機構10について、図5～図10、図14、図15、図17、図19を参照して説明する。針棒台フレーム13の上支持部14bと下支持部14aには、針棒18の左側に位置する糸通し軸31とスライダガイド軸32とが上下動可能に支持されている。糸通し軸31の上端部は、ブラケット16と軸部材16aの間の隙間に挿通しており、糸通し軸31の略中段部には、水平方向に突出する摺動ピン33が固着されている。

【0037】糸通し軸31の下端部には、合成樹脂製のフック保持部材34が固着され、フック保持部材34の上側と下側に対応する糸通し軸31に、側面視略コ字形状の第1糸案内部材35（図17参照）の上支持部、下支持部が回転可能に支持されている。この第1糸案内部材35のうち、上支持部と下支持部とを連結する鉛直状の連結壁36には、上糸24に係合して案内する糸ガイ

ド36aが切欠き状に形成されている。

【0038】図9(a)～(c)に示すように、フック保持部材34にはフック機構37が固定され、このフック機構37は、糸通しフック37aと、糸通しフック37aの両側に位置する2枚のガイド部材37bと、これら糸通しフック37aとガイド部材37bを水平に貫通する糸保持ワイヤ37cなどから構成されている。糸通しフック37aの先端部にはフック部が形成され、糸通しの際針穴19aにこのフック部が挿通し、針19が前記ガイド部材37bにより案内されつつ針穴19aの直前に位置する上糸24を引っ掛けるようになっている。

【0039】フック保持部材34には、第2糸案内部材38が一体的に固着され、この第2糸案内部材38の略先端近傍部が下方に屈曲形成され、その屈曲部が糸案内部材38aとして機能している。糸案内部材38aは、糸通し軸31に対しフック機構37と略反対側に位置し且つ所定距離だけ離隔している。即ち、この第2糸案内部材38とフック機構37とが一定の位置関係を保持して糸通し軸31に一体的に設けられている。

【0040】次に、糸通し軸31を所定角度だけ回転させる回転機構について説明する。図5～図8、図14、図15、図17、図19に示すように、針棒台フレーム13の背面側において糸通し軸31とスライダガイド軸32の上端部には、合成樹脂製の糸通しスライダ40が上下動可能に外嵌されている。即ち、糸通しスライダ40は、上枢支部41及び下枢支部42と、外周壁部43と、糸通しスライダ爪44とを有する。

【0041】上枢支部41及び下枢支部42は、糸通し軸31とスライダガイド軸32とにわたって設けられ、外周壁部43は、これら上枢支部41と下枢支部42とを鉛直状に連結し且つ糸通し軸31の前記上端部の外周の略半分を覆うように形成されている。この外周壁部43には螺旋状の糸通しスライダカム部43aが形成されている。上枢支部41と下枢支部42の左端部には、糸通しスライダ爪44が連結され、その左端略中段部分に爪部44aが形成されている。

【0042】糸通し軸31の略中段部のうち、下枢支部42の直ぐ上側に対応する位置には、所定長さの摺動ピン33が貫通状に固定され、この摺動ピン33の奥側端部が糸通しスライダカム部43aに係合している。糸通し軸31のうち摺動ピン33よりも一定長さ下側には、バネ受けピン45が貫通状に固定され、糸通し軸31のうち下枢支部42とバネ受けピン45との間には、圧縮コイルバネ46が外装されている。スライダガイド軸32のうち下枢支部42と、針棒台フレーム13の下支持部14aとの間には、糸通しスライダ40を上方へ付勢する為の圧縮コイルバネ47が外装されている。

【0043】ここで、オフセット部材48について説明すると、図4～図8に示すように、糸通し軸31とスライダガイド軸32には、糸通しスライダ40の背面側

で且つ針棒台フレーム13の上支持部14b、下支持部14a間の高さの約3/4長さ範囲において、オフセット部材48が上下動可能に装着されている。このオフセット部材48は、上支持部49と、下支持部50と、これら上支持部49と下支持部50とを連結する鉛直状の連結壁51等から構成されている。上支持部49は、糸通し軸31とスライダガイド軸32とに挿通され、下支持部50は糸通し軸31のみに挿通されている。

【0044】針棒18の針棒抱き23の直ぐ上方には、係合片としての糸通し位置決め部材52が固定され、オフセット部材48の上支持部49の右端部分が、この糸通し位置決め部材52に上方から当接可能に構成されている。この上支持部49の右端部分が糸通し位置決め部材52に当接した状態で、糸通しフックが針19の針穴19aの高さ位置に合致するようになっている(図6参照)。連結壁51の左端下部には、オフセット部材カム部53が形成され、このオフセット部材カム部53は、下方に向かう程左側に突出する傾斜部53aと、この傾斜部53aの下端から鉛直下方に延びる平坦部53bであって、糸通しスライダ爪44の爪部44aよりもやや左方に突出する平坦部53bとを有する。

【0045】後述する上糸カセット2により糸通しスライダ40を、圧縮コイルバネ47の付勢力に抗して図5に示す上限位置から下方に押下げると、糸通し軸31とスライダガイド軸32とオフセット部材48が追従して下降し、オフセット部材48の上支持部49が糸通し位置決め部材52に当接した状態で停止する(図6参照)。このとき、糸通し軸31とスライダガイド軸32に対して糸通しスライダ40が相対的に下降するので、摺動ピン33が螺旋状の糸通しスライダカム部43aに沿って移動する。糸通し軸31が平面視にて時計回り方向に所定角度だけ回転して糸通しされる(図9(a)～(c)参照)。

【0046】この糸通しのとき、フック機構37が針19に接近する方向に回転され、前記糸通しフックが針穴19aに挿通する。同時に、第2糸案内部材38がフック機構37と同期して時計回り方向(針19から遠ざかる方向)に回転される。糸通しに際して、糸通し軸31の下端部に回転可能に支持された第1糸案内部材35を第2糸案内部材38から離隔する方向に回転させるリンク機構54も設けられている。即ち、糸通し軸31が糸通しの為に回転する前の待機状態のときには、第2糸案内部材35が前方向きの姿勢であり、第2糸案内部材38の糸案内部材38aは、連結壁36の糸ガイド36aの直ぐ内側に位置している。

【0047】糸通し軸31が下限位置まで下降した後に回転するときには、フック機構37と第2糸案内部材38とが平面視にて時計回り方向に一体的に回転すると共に、リンク機構54を介して第1糸案内部材35が反時計回り方向に回転する。つまり、第1糸案内部材35

は、第2糸案内材38から離隔移動し且つフック機構37に接近移動するようになっている。尚、リンク機構54付近部には、上糸24を微圧挟持する支持板55、糸案内皿56も設けられている。

【0048】次に、上糸カセット2について説明する。図1、図10、図14～図36に示すように、可動操作体としての上糸カセット2は、左右方向幅が小さな縦長の直方体に近い形状のカセットケース57と、糸駒62を収容する糸駒収容部57aと、糸駒収容部57a内に糸駒62を保持する糸駒保持部58と、糸駒保持部58に保持された糸駒62と、糸駒62から繰り出される上糸24を糸出口68まで案内する糸経路59と、天秤機構8の天秤25の糸掛け部26が上下に往復移動する領域である天秤移動領域57bと、糸調子器9を突入させる糸調子器収容部57c等を有する。尚、カセットケース57の底壁のうちの右端近傍部に糸出口68が形成されている。

【0049】カセットケース57は、合成樹脂製のカセット本体60と開閉蓋61とを有し、カセット本体60の右端部に開閉蓋61が開閉可能に連結されている。但し、開閉蓋61はカセット本体60に対して上下にスライドさせて開閉するように構成してもよい。糸駒62の上糸24の糸色を識別する糸色識別手段として、開閉蓋61は透明な材料で構成され、カセットケース57内の糸駒62の糸色を識別可能となっている。尚、別の糸色識別手段として、例えば、開閉蓋61に糸駒62を視る為の開口穴を形成してもよく、或いは、カセットケース57の表面の一部に糸駒62の上糸24の色と同色のシールを貼ってもよい。

【0050】図10、図16、図28～図33に示すように、天秤移動領域57bはカセットケース57内の右側の約1/3幅部分に形成され、糸駒収容部57aはカセットケース57内の左側の約2/3幅部分のうちの上部約2/3部分に形成され、糸調子器収容部57cはカセットケース57内の左側の約2/3幅部分のうちの下部約1/3部分に形成され、カセット本体60内の左端部には糸経路59の為の領域が仕切壁66、99で仕切られている。

【0051】天秤移動領域57bにおいてカセット本体60の後壁には天秤25の糸掛け部26と後述の糸案内材106Aを突入させる為の縦長のスリット101が形成されている。糸調子器収容部57cにおいてカセット本体60の後壁と底壁には、糸調子器収容部57cに糸調子器9を導入する為の切欠き部96が形成されている。天秤移動領域57bと糸駒収容部57a及び糸調子器収容部57cの間には鉛直の仕切壁67、100が形成され、糸駒収容部57cと糸調子器収容部57aの間には開閉蓋61側へ突出する水平な支持壁63が形成されている。

【0052】糸駒保持部58は、糸駒62をその軸心を

鉛直向きに保持するように構成されているため、カセットケース57の左右方向の幅を小さくし、カセットケース57及びカセット装着部3の小型化を図ることができる。糸駒保持部58は、支持壁63（収容部の壁部に相当する）と糸駒保持軸64とで構成されている。この支持壁63には糸駒保持軸64が上方に突出するように設けられている。この糸駒保持軸64は、周方向に3つ割りに形成されて捻じ方向に弾性変形可能であり、種々のサイズの軸穴を有する糸駒62を保持可能になっている。

【0053】支持壁63のうち、糸駒62の下端（軸心方向の一端）と当接する部分の前端部には、糸駒62を下方から押して糸駒保持軸64から上方へ取り外す為の凹部65が形成されている。この凹部65は、糸駒62の外周面よりも半径方向内側に窪んだ切欠き状に形成され、上糸24が弛んでも糸駒62と支持壁63の間に上糸24が入り込まないようにしている。

【0054】次に、糸経路59について説明する。図14、図15、図17～図21に示すように、糸経路59は、糸駒保持部58に保持した糸駒62からの繰り出し点79を基点とし、糸駒62から上方へ繰り出した上糸24をカセットケース57の糸出口68に導く上糸案内経路である。糸経路59は、第1案内内部69と、第1挟持部70と、第2案内内部71と、第3案内内部72と、第2挟持部73とを有する。糸駒62を糸駒保持部58に保持した状態で、糸駒62から上方へ繰り出された上糸24は、第1案内内部69、第1挟持部70、第2案内内部71、第3案内内部72、第2挟持部73を順に経由してカセットケース57の右端近傍の下端部の糸出口68に導かれる。

【0055】図17、図19、図22～図25に示すように、第1案内内部69と第1挟持部70は、糸経路59の上流側部分に設けられている。第1案内内部69は、カセットケース57の頂部に設けられている。第1案内内部69は、カセット本体60に形成されたピン支持部材74と、このピン支持部材74から前方へ突出し更に右方へ曲折した平面視L字状の案内ピン75と、開閉蓋61に形成された糸抜け防止用のリブ76等で構成されている。

【0056】案内ピン75は、前後方向に所定長さのある糸案内内部を有し、この糸案内内部を外部に臨ませるように、カセット本体60と開閉蓋61の頂部壁には、矩形切欠き状の開口部77、78が夫々対向状に形成され、外部の糸駒から供給される上糸を開口部77、78から第1案内内部69へ導入可能になっている。糸駒62から繰り出された上糸24は、案内ピン75の糸案内内部に前後方向に移動自在に掛けられ、これにより糸駒62と第1案内内部69間の距離があまり長くない場合でも、糸駒62から上糸24を円滑に引き出すことができる。

【0057】第1挟持部70について説明すると、図2

3、図24に示すように、第1挾持部70は、糸経路59の上流側部分において上糸24に通過抵抗を与えると共に上糸に糸よりによる糸の絡まり等が発生するのを防止する為のものであり、この第1挾持部70は、カセットケース57内の左端部の上端付近に設けられている。第1挾持部70は、糸案内内部80aを有する押え板80と、この押え板80に上糸24を押圧する板バネ81とを備えた糸より発生防止機構82からなる。

【0058】押え板80と板バネ81はカセット本体60の仕切壁66に固定されている。押え板80の糸案内内部80aは、上方開放の狭幅の切欠きであり、糸案内内部80aがカセット本体60よりも前方へ突出している。板バネ81は糸案内内部80aの左側面に当接して糸案内内部80aとの間に上糸24を挾持し、上糸24に通過抵抗を付与することにより上糸24に糸よりによる糸の絡まり等が発生するのを防止する。

【0059】次に、図14、図15、図17～図21、図26、図27に示すように、第2、第3案内内部71、72と第2挾持部73は、糸経路59の下流側部分に設けられている。第2案内内部71はカセットケース57内の左端部の下端部にあり、第3案内内部72はカセットケース57内のうちの糸調子器収容部57cと天秤移動領域57bの境界部の下端部にあり、第2挾持部73はカセットケース57内の右端近傍の下端付近にある。

【0060】上糸24は、第1案内内部69から第1挾持部70へ斜めに延び、この第1挾持部70から第2案内内部71へ鉛直に延び、第2案内内部71から第3案内内部72へ水平に延び、第3案内内部72から第2挾持部73へほぼ水平に或いは傾斜状に延びている。このように、上糸24は、カセットケース57の下端部に沿って横断する状態に導かれている。

【0061】第2案内内部71は、カセット本体60の後壁部に設けたピン支持部83と、このピン支持部83に固定されて前方へ突出する案内ピン84と、開閉蓋61に形成された糸抜け防止用のリブ85などからなる。ピン支持部83とリブ85とで上糸24の前後方向位置が適切に設定される。第3案内内部72は、カセット本体60の後壁部に設けたピン支持部86と、このピン支持部86に固定されて前方へ突出する案内ピン87と、開閉蓋61に形成された糸抜け防止用のリブ88などからなる。ピン支持部86とリブ88とで上糸24のの前後方向位置が適切に設定される。

【0062】次に、第2挾持部73について説明する。図14、図15、図17～図21、図33～図36に示すように、第2挾持部73は、糸出口68の付近において上糸24に通過抵抗を与えるものである。上糸カセット2をカセット装着部3に未装着の状態においても、装着完了しない状態においても、第2挾持部73は上糸24に第1挾持部70よりも強い通過抵抗を与えるように構成してある。そのため、上糸カセット2の装着時に上

糸24を天秤25の糸掛け部26と糸調子器9に糸掛けする際に、第2案内内部71と第2挾持部73の間で、上糸24が緊張状態を維持するため、天秤25の糸掛け部26と糸調子器9に確実に糸掛けすることができるうえ、その糸掛けに際して必要な上糸24を糸駒62から確実に上糸24を繰り出すことができる。つまり、第3案内内部72と第2挾持部73とが、天秤25の糸掛け部26に糸掛けする際にその上糸24を操作する上糸操作部として機能とする。

【0063】第2挾持部73は、軸心を左右方向に水平に向けた可動の可動軸部材94と、上糸24を案内する案内ピン89と糸保持板90と板バネ部材91などで構成されている。可動軸部材94は、小径の軸部と、カセット本体60の下端部の右側面に対して出没自在の大径の操作ボタン94aとからなる。この可動軸部材94は、カセット本体60の右端近傍かつ下端近傍部の縦壁部92、93に左右方向へ水平移動可能に装着され、板バネ部材91で右方へ弾性付勢されている。

【0064】可動軸部材94の左端部には、案内ピン89の後端部が前後方向向きに貫通固着され、案内ピン89と縦壁部93の左側面の間には、案内ピン89との間に上糸24を保持する糸保持板90が固着され、可動軸部材94と共に右方へ付勢された案内ピン89と糸保持板90との間に上糸24を挾持することで、上糸24に通過抵抗を付与するようになっている。

【0065】図14、図18に示すように、上糸カセット2をカセット装着部3から取り外した状態においては、板バネ部材91の付勢力により、操作ボタン94aの先端部がカセット本体60の右側面から突出している。そのため、上糸カセット2をカセット装着部3に装着しない状態において、糸駒62から上糸24を繰り出す場合には、操作ボタン94aを指で押し込むことで、可動軸部材94と案内ピン89を左方へ移動させて第2挾持部73を開放状態にし、第1挾持部70の通過抵抗に抗して上糸24を繰り出すことができる。そして、後述のように、上糸カセット62をカセット装着部3に装着完了した状態では、上糸24に通過抵抗を与えないように第2挾持部73は開放状態となる。

【0066】図19、図20に示すように、上糸カセット2をカセット装着部3に装着完了した状態においても第2挾持部73を開放状態にする為に、カセット装着部3の右側壁に操作ボタン94aを逃す為の縦溝部95aと、上糸カセット2の装着完了状態において操作ボタン94aを退入状態にする上糸開放カム95が形成されている。これらについてはカセット装着部3の説明において後述する。

【0067】上糸カセット2をカセット装着部3に装着完了した状態では、第2挾持部73は開放状態となるが、上糸カセット57内の糸調子器収容部57cに突入する糸調子器9に上糸24が挾持されて通過抵抗を付与

されるため、第1挟持部70と糸調子器9との間の上糸24は緊張状態を維持する。そのため、糸経路59の糸調子器9よりも上流側の糸24に糸よりによる糸の絡まり等が発生することはない。尚、前記糸調子器9をアーム部6に装備する代わりに、上糸カセット2内に糸調子器9を装備することも可能であり、この場合も前記同様に、第1挟持部70と糸調子器9間の糸24が緊張状態を維持するため、糸よりによる糸の絡まり等が発生するのを防止できる。

【0068】前記のように、上糸24を第1挟持部70で挟持し、かつ糸調子器9の後記糸調子皿間で挟持して通過抵抗を与え、これら間でその上糸を緊張状態とした場合、糸調子器9の糸調子皿の入口部分で上糸が挟持されて抵抗が加わると、この部分において、その糸本来の構造上のよりがさらに締まる方向に強化されるので、前記第1挟持部70と糸調子器9の糸調子皿との間の上糸部分には、常に、糸本来の構造上のよりがさらに強化された糸よりが発生している。

【0069】この状態で、もしも、この間の上糸部分が弛んだ場合、この上糸部分のある所で折れ曲がって、この部分を中心として糸同士が直線状やだんご状に絡まる現象が生じる。このような絡まり部分が糸調子器9の糸調子皿に案内されると、その糸調子皿に引っ掛かって糸切れや糸の引きつり等が発生する。しかしながら、前記のように、上糸24を前記第1挟持部70と糸調子器9の糸調子皿とでそれぞれ挟持してこの間の上糸部分を緊張状態としておくことにより、前記のような絡まり現象が発生しない。尚、糸調子器9の糸調子皿を通過した上糸部分は、前記のように強化された糸よりが戻される。

【0070】次に、上糸カセット2をカセット装着部3に装着する際に、糸調子器9をカセットケース57内の糸調子器収容部57cに突入させる為の構成について説明する。図1、図14、図15、図23、図26、図30、図31に示すように、糸調子器収容部57cの下方において、カセット本体60と開閉蓋61の底壁には、矩形切欠き状の開口部97、98が夫々対向状に形成され、カセット本体60の後壁部には、開口部97に連なる部分長円形状の切欠き部96が形成されている。上糸カセット2の装着の際、切欠き部96と開口部97、98を通して糸調子器9が糸調子器収容部57cに突入状に収容される。

【0071】図1、図3、図11～図15、図26、図27、図30、図31に示すように、天秤移動領域57bの下方において、カセット本体60と開閉蓋61の底壁には、矩形切欠き状の開口部102,103が夫々対向状に形成され、カセット本体60の後壁には、開口部102に連なり且つ下端から上端近くまで延びる縦長のスリット101が形成され、上糸カセット2をカセット装着部3に装着する際に、これら開口部102,103とスリット101を

ットケース57内へ突入状に導入される。

【0072】図21、図22、図24に示すように、カセット本体60の後壁のうちの糸駒収容部57aに面する後壁は、糸駒62の収容のために後方へ部分円筒状に膨出しており、その部分円筒部の下端に対応する部位には、カセット装着部3の後述の受止め部109に上方から係合して上糸カセット2の高さ位置を決定する係合部112が形成されている。カセット本体60の後壁の左右両端部には、カセット装着部3の後述のガイド溝110,111に夫々係合可能な突条的な係合部113,114が形成されている。上糸カセット2をカセット装着部3に装着した状態で、開閉蓋61の前面がアーム部6の前面と同一面となし、カセット本体60と開閉蓋61の上壁がアーム部6の上面と同一面をなすように形成されている(図19、図22参照)。

【0073】次に、上糸カセット2の糸止め部104について説明する。図25、図30、図35、図36に示すように、カセットケース57の外面部のうち、開閉蓋61の枢支部の面取り部105と、開閉蓋61を閉じた状態でこの面取り部105に接するカセット本体60との間に、上糸カセット2の外部へ延びた上糸24の糸端側部分を仮止めするように構成され、これら面取り部105とカセット本体60の一部とで糸止め部104が構成される。但し、糸止め部104Aとして、図35、図36に示すように、カセットケース57の外面部に、ケース側に付勢された板バネ片を設け、この板バネ片に上糸24の糸端部分を仮止めするように構成してもよい。

【0074】次に、上糸カセット2を上方から着脱自在に装着する為のカセット装着部3について説明する。図1、図2、図4、図21に示すように、操作体装着部としてのカセット装着部3は、ミシンのアーム部6の先端側部分(アーム頭部)の前面部に正面視にて縦長の長方形形状に且つほぼ左右に細長の長方形断面溝状に形成されている。カセット装着部3の右端側部分には、天秤25の糸掛け部26が往復移動する上下に細長い天秤移動領域27が設けられ、この天秤移動領域27を除くカセット装着部3の大部分は天秤移動領域27の左側に位置している。

【0075】糸駒保持部58に保持した糸駒62の軸心を天秤25の糸掛け部26の往復移動方向とほぼ平行にして、鉛直方向上方から上糸カセット2を装着したり、鉛直上方へ上糸カセット2を取り外したりできるようにカセット装着部3の上端と下端は開放状に形成されている。カセット装着部3の中央よりもやや左側部位の下端付近には、糸調子器9がその軸心を前後方向向きにして前方へ突出する状態に設けられている。カセット装着部3の後壁の下部には、上糸カセット2の係合部112を受け止めて、上糸カセット2を所定の高さ位置に位置決めする段状の受止め部109が形成されている。カセット装着部3の左側壁と右側壁の後端付近には、上糸カセ

ト 2 の係合部 113, 114 を夫々摺動自在に導入して案内するガイド溝 110, 111 が夫々形成されている。

【0076】次に、第 2 挟持部 73 を開放状態に切換える為にカセット装着部 3 に設けた上糸開放カム 95 について説明する。図 18、図 20 に示すように、カセット装着部 3 の右側壁の後部には、前記の縦溝部 95a とその末端側に位置する上糸開放カム 95 が形成されている。縦溝部 95a はカセット装着部 3 の上端から下端付近部まで連続しており、上糸開放カム 95 は縦溝部 95a の下端にテーパ部 95b を介して連続し縦溝部 95a よりも左側へ突出している。

【0077】従って、図 17、図 18 に示すように、上糸カセット 2 をカセット装着部 3 に装着して装着完了直前まで、カセット本体 60 の右側面から突出した操作ボタン 94 が溝部 95a に沿って移動する。このとき、第 2 挟持部 73 は上糸 24 に通過抵抗を付与する。上糸カセット 57 をカセット装着部 3 に完全に装着し上糸カセット 57 の装着が完了した状態では、操作ボタン 94 が上糸開放カム 95 に当接して左方へ押動された状態となる。このとき、第 2 挟持部 73 は開放状態となり、上糸 24 に通過抵抗が付与されなくなる。

【0078】次に、天秤機構 8 について詳しく説明する。図 11～図 14 に示すように、この天秤機構 8 は、上糸カセット 2 をカセット装着部 3 に装着する動作に連動して糸掛け部 26 に上糸 24 を糸掛けできるように工夫した特有の構造のものである。この天秤機構 8 は、カム式天秤機構を例としているが、リンク式天秤機構にも同様に、以下の構成を適用可能である。この天秤機構 8 は、主軸の駆動力で天秤クランク 20 を介して駆動される天秤 25 と、この天秤 25 の糸掛け部 26 の移動軌跡の全長に沿って湾曲状に延びる糸案内隙間 108 を形成する糸案内材 106A を有し、この糸案内隙間 108 に上方から上糸 24 を導入して糸掛け部 26 に糸掛け可能に構成してある。

【0079】糸案内材 106A は、天秤 25 の先端部（糸掛け部 26）の移動軌跡の全長に沿って湾曲状に延び糸案内隙間 108 を空けて前後に離隔した 1 対の糸案内具 106 からなる。1 対の糸案内具 106 は下端部で連続した 1 本の線状部材（金属製又は合成樹脂製）で構成され、後側の糸案内具 106 の上端部分が後方へ水平に延びてミシン機枠の頂部枠に枢支金具 107 を介して回動自在に支持され、糸案内材 106A の下端部は自由端をなしている。前側の糸案内具 106 の上端部は前側へ屈曲されて、糸案内隙間 108 へ上方から上糸 24 を導入する為の導入口 108a が形成されている。尚、糸案内材 106A と天秤 25 の糸掛け部 26 は、カセット装着部 3 の後壁の開口からカセット装着部 3 内へ突出している。

【0080】天秤 25 の先端側部分には、先端側所定長さ部分を後方へ折り返すことで形成された平面視にて U 形の案内部 25a が設けられている。1 対の糸案内具 106

6 は U 形案内部 25a を相対摺動自在に挿通しており、U 形案内部 25a が上下に往復運動するとき、1 対の糸案内具 106 は上端部において回動しながら U 形案内部 25a で案内されるため、U 形案内部 25a に対する摺動抵抗も小さく、騒音も殆ど発生しない。U 形案内部 25a のうちの 1 対の糸案内具 106 の間（つまり、糸案内隙間 108）に対応する部位には、上方から上糸 24 を掛ける糸掛け部 26 であって上面に上糸を掛ける U 形凹部を有する糸掛け部 26 が形成されている。

【0081】従って、糸駒 62 の軸心を天秤 25 の糸掛け部 26 の往復移動方向とほぼ平行にして、上糸カセット 2 を鉛直上方から装着するとき、その装着動作に連動して自動的に、上糸カセット 57 の第 3 案内部 72 と第 2 挟持部 73 の間の上糸 24 を導入口 108a から糸案内隙間 108 に導入して天秤 25 の糸掛け部 26 に簡単に掛けることができる。尚、糸案内材 106A は、線状部材ではなく、金属製又は合成樹脂製の板状部材で構成してもよい。

【0082】次に、上糸カセット 2 の作動を自動糸通し機構 10 に伝達する伝達機構 115 について説明する。図 5～図 8 に示すように、この伝達機構 115 は、上糸カセット 2 の作動を糸通しスライダ作動機構 116 を介して自動糸通し機構 10 に伝達すると共に、糸通し位置決め部材 52 との係合により解除作動する係合機構 117 が設けられている。この糸通しスライダ作動機構 116 は、糸通しスライダ作動部材軸 118（以下、軸 118 という）と、糸通しスライダ作動部材 119 と、糸通しスライダ作動部材レバー 120（以下、レバー 120 という）と、糸通しスライダ作動爪 121（以下、作動爪 121 という）と、糸通しスライダ作動爪バネ 122（振じりバネ 122）と、糸通しスライダ作動部材ストッパー 123（以下、ストッパー 123 という）等から構成されている。

【0083】図 4、図 5、図 10 に示すように、カセット装着部 3 の近傍においてアーム部 6 内には、軸 118 が鉛直方向に支持され、この軸 118 に側面視略コ字形状の糸通しスライダ作動部材 119 が上下動可能に支持されている。糸通しスライダ作動部材 119 には平面視コ字形状のレバー 120 が固着され、このレバー 120 の前板部のうち右端の略中段部に、板状のレバー部 120a が前方に突出するように設けられている。レバー部 120a の先端部は、アーム部 6 内からカセット装着部 3 の受止め部 109 を貫通して所定長さ突出するように形成されている。受止め部 109 の略中段部から下端にわたりスリット 124 が形成され、レバー部 120a がこのスリット 124 に沿って上下動可能に構成されている。

【0084】軸 118 の上端近傍の天板にはブラケット 125 が固着され、軸 118 の背面側で且つストッパー 123 とレバー 120 とにわたり引張コイルバネ 126 が介装され、レバー 120（つまりレバー部 120a）を上方に付勢するようになっている。尚、上糸カセット 2 の装着完了状態

(縫製位置)を保持するため、引張コイルバネ126の付勢力よりも糸保持ボタン94とカム95間に作用する摩擦抵抗が大きくなるように構成されている。

【0085】係合機構117について説明すると、図4～図8に示すように、レバー120の右端側上部には、作動爪121が枢支されている。この作動爪121は、その下端部が糸通しスライダ爪44の爪部44aに係合可能なロック位置と、爪部44aとの係合状態が解除された解除位置とにわたって揺動可能に構成されている。但し、枢支軸127には、糸通しスライダ作動部材119、作動爪121間に作用する振りバネ122が外装され、作動爪121をロック位置側に付勢するようになっている。

【0086】作動爪121の下端部は、オフセット部材カム部53に対して当接離隔可能に構成され、糸通しスライダ作動部材119をロック位置の状態下方に押し下げると、作動爪121の下端部がオフセット部材カム部53の傾斜部53aに当接し傾斜部53aに沿って左方に移動し、オフセット部材48の上支持部49の右端部分が、糸通し位置決め部材52に上方から当接した状態で、図6に示すように、解除位置に切り換わって係合機構117が解除作動されるように構成されている。作動爪121が解除位置に切換わると、糸通しスライダ40及びオフセット部材48は、図6に示す下限位置から圧縮コイルバネ46、47の付勢力により上方復帰するようになっている。

【0087】ストッパー123について説明すると、図4～図8に示すように、ブラケット125の左端部には、ストッパー軸128が前後方向向きに支持され、このストッパー軸128に側面視略逆し字形状のストッパー123が枢支されている。ストッパー123は、ストッパー軸128から略鉛直下方向きに延びる鉛直部129と、ストッパー軸128から略水平右向きで且つ針棒18の上方位置まで延びる水平部130と、これら鉛直部129と水平部130を図8において時計回り方向に付勢する前記引張コイルバネ126(図10参照)とを有する。鉛直部129の下端部には、下方に向かう程左斜め向きに傾斜する傾斜部131が形成されている。

【0088】傾斜部131と鉛直部129の交差する左端部分にストッパー部132(段部に相当する)が形成され、糸通しスライダ作動部材119の下端部には、このストッパー部132に上方から係合可能なストッパー係合部119aが形成されている。針棒18の上端つまりストッパー123が(イ)から(ロ)の適正範囲にある場合(図8参照)には、上糸カセット2により糸通しスライダ作動部材119が図5に示す上限位置から下方に移動するとき、ストッパー係合部119aがストッパー123の傾斜部131に接触し、その後、傾斜部131の左端に対して糸通しスライダ作動部材119のガイド壁119bが摺動する。

【0089】糸通しスライダ作動部材119の下方移動に伴い、ストッパー123が引張コイルバネ126の付勢力に

抗して反時計回り方向に揺動するから、糸通しスライダ作動部材119は上限位置から図6に示す下限位置まで移動可能となる。針棒18の上端が適正範囲外にある場合には、ストッパー123が(ロ)の位置(図8参照)から更に時計方向回りに揺動する。この状態で糸通しスライダ作動部材119を下方に移動させようとしても、ストッパー部132に対してストッパー係合部119aが係合するから、糸通しスライダ作動部材119は移動不可能となり、糸通しが禁止される。

【0090】図7に示すように、糸通しスライダ作動部材119のガイド壁119bが、ストッパー123の傾斜部131に摺動することで、ストッパー123の水平部130の高さ位置が規制されて、最上位置のときの針棒18の上端と水平部130との間に微小隙間Sが形成され、針棒18とストッパー123との打撃音の発生を防止している。

【0091】次に、糸調子器9と、糸調子器9の為の連動機構134について説明する。連動機構134は、上糸カセット2のカセット装着部3への装着動作の途中において上糸カセット2により1対の糸調子皿133を開放させ且つ装着動作の完了時には糸調子皿133を閉じさせる機構である。図4、図10、図16、図37～図45に示すように、糸調子器9は、上糸カセット2がカセット装着部3に装着された状態ではカセットケース57内の糸調子器収容部57cに突入する。糸調子器9は1対の糸調子皿133と、これら糸調子皿133を支持する軸部材と、後側の糸調子皿133の後側にある作動板139と、後側の糸調子皿133と作動板139を前方へ弾性付勢するバネ部材と、糸調子皿133の付近で上糸24を弾性的に支える糸調子バネ135と、バネ力調節用の糸調子ダイヤル136などを備えた一般的な構造のものである。

【0092】図37～図45に示すように、連動機構134は、上糸カセット57の後側面に形成されたカム部137と、縦向きのレバー状のカム従動部材138と、回転アーム151とを有する。カセット本体60の後壁のうち左端側部分の上半部には、後方にやや突出する突条のようなカム部137が形成されている。糸調子器9を支持するフレーム140の上部にはブラケット141が形成され、このブラケット141には、カム従動部材138の長さ方向途中部が左右方向向きの水平ピンにて回転自在に支持され、このカム従動部材138は振りバネ144により図41において時計回り方向へ付勢されている。

【0093】カム従動部材138の上端部にはローラ142が遊転可能に枢着されている。カセット装着部3の後壁の左側部分には、上糸カセット57のカム部137を後方へ突出させるスリット143(図14参照)が形成され、このスリット143から後方へ突出したカム部137にローラ142が当接可能になっている。回転アーム151の右端部は縦向きのピンにてベース板155の下板部にピン連結されて水平回転可能であり、カム従動部材138の下端部が回転アーム151の左端部分の後面に当接し、回転アーム

ム151の突部151aが作動板139に当接可能になっている。

【0094】カム部137の形状とローラ142の位置を適切に設定することで、上糸カセット57の装着途中において糸調子皿133を開かせて1対の糸調子皿133と糸調子バネ135に糸掛けし、その後上糸カセット57の装着完了時に糸調子皿133を閉じるように構成してある。即ち、上糸カセット57がカセット装着部3に装着されて上糸カセット2が糸調子器9の上方所定距離まで達したときに、カム部137にローラ142が乗り上げてカム従動部材138が図41において反時計回りに回動し、回動アーム151と作動板139とで糸調子皿133を開かせる。

【0095】その状態で上糸カセット57が下降して来ると、第2、第3案内部71、72間の上糸24が1対の糸調子皿133の間に糸掛けされ、その後上糸カセット57が装着完了状態になる頃カム部137は低くなりローラ142を後方へ押さなくなるので、回動アーム151が後方へ復帰回動し、作動板139が後方へ復帰移動し、1対の糸調子皿133が閉じた状態になる。尚、以上の上糸カセット57の装着時の連動機構134の作動は、押え上げレバー29の位置（下方回動位置または上方回動位置）に関係なく生じる。

【0096】次に、通常の実シンと同様に、押え上げレバー29の操作で1対の糸調子皿133を開かせる機構は、周知の機構であるので簡単に説明する。図37～図45に示すように、押え上げレバー29の上端部は機枠に回動自在に枢支され、この押え上げレバー29のカム部29aに係合した係合アーム152の上端部も機枠に回動自在に枢支されている。係合アーム152は連結ロッド153により水平な三角板154の後端部に連結されている。三角板154は機枠側のベース板155下板部の下側に配設され、この三角板154の前端部の左端部がベース板155の下板部に縦向きのピンにて回動自在に枢着され、三角板154の前端部の右端部が作動板139に当接している。

【0097】従って、押え上げレバー29が下方回動位置にあるとき、連結ロッド153が右方へ引っ張られないので三角板154が回動せず、糸調子皿133が閉じた状態を保持する。押え上げレバー29を上方回動位置に切換えると、連結ロッド153が右方へ引っ張られるため三角板154が回動して糸調子皿133が開いた状態となる。

【0098】次に、前記実シン1の作用と上糸カセット2の作用について説明する。図14、図23～図27に示すように、上糸カセット2をカセット装着部3に装着してない状態において、上糸カセット2の開閉蓋61を開き糸駒62を糸駒保持部58に装着する。次に、糸駒62から引き出した上糸24を第1案内部69に掛け、第1挟持部70の糸案内部80aに掛けて板バネ81で押圧する。次に、その上糸24を第2、第3案内部71、72に順々に掛け、第2挟持部73の案内ピン89

と糸保持板90との間に挟持させる。

【0099】次に、板バネ部材91の付勢力に抗して操作ボタン94aを指で押圧し、案内ピン89を糸保持板90から離隔させてから、上糸24を外部へ所定長さ引っ張り出し、その後操作ボタン94aを押圧するのを解除して第2挟持部73のにより上糸24を挟持し、開閉蓋61を閉じる。尚、上糸カセット2への糸掛け手順を判り易くするため、第1案内部69、第1挟持部70、第2、第3案内部71、72、第2挟持部73の各近傍に糸掛け順指示マークを貼着し、そのマークの順番に従って糸掛けさせるように構成してもよい。

【0100】一方、実シン1が縫製停止状態のときには、通常針棒18は針上位置に停止しており、天秤25の糸掛け部26は図13に示す糸締め側の略中段位置に停止している。この状態において、カセット装着部3に上方から上糸カセット2を装着していく。カセット装着部3は上方と下方の両方に開放されているため、上糸カセット2の糸出口68から約20cm程度引出された上糸24は、カセット装着部3の下方に鉛直向きに垂れ下がる。尚、縫製開始時には、天秤25の糸掛け部26は前記の糸締め側の略中段位置から上昇してから下降することになる。

【0101】図15、図16に示すように、上糸カセット2の装着途中において、上糸カセット2の係合部112がレバー部120aに当接した状態で上糸カセット2を一旦停止させる。このとき、図15に示すように、第3案内部72と第2挟持部73との間の上糸24が案内隙間108に導入されて天秤25の糸掛け部26に掛かった状態になっている。この場合、第2挟持部73は第1挟持部70よりも強い通過抵抗を与えるから、上糸24がカセット2内に引き戻されることなく糸駒62から上糸24が必要量繰出される。尚、この移動停止位置を確認する為の1対の合印146が上糸カセット2と実シン1に設けられている。

【0102】次に、上糸カセット2の糸出口68から下方に垂れ下がった上糸24を、針棒糸掛け147と糸ガイド36aに順に掛け、支持板55と糸案内皿56との間に微圧にて挟持させた後、糸端を図示外の糸切り刃で切る。次に、図17に示すように、上糸カセット2を引張コイルバネ126の付勢力に抗して下方に押下げると、上糸カセット2の作動が伝達機構115を介して自動糸通し機構10に伝達され、針穴19aへ上糸24を通す糸通しが実行される。上糸カセット2の糸通し作動部としての係合部112がレバー120の先端のレバー部120aを下方へ移動させるため、上糸カセット2の移動が伝達機構115に伝達される。これと並行して、天秤25に対して上糸カセット57が相対的に下方移動するため、第3案内部72と第2挟持部73間の糸経路が長くなる関係上、糸駒62からの上糸24の繰り出しがなされる。

【0103】このとき、既述の如く、連動機構134によ

り糸調子器9の糸調子皿133を開放させ、第2、第3案内71、72間の上糸24が糸調子皿133の間と糸調子バネ135に糸掛けされる。第1挟持部70と第2挟持部73とにより両部間の上糸24に一定の張力を付与しているから、天秤25、糸調子皿133、糸調子バネ135に確実に上糸24が掛かることになる。第2挟持部73は第1挟持部70よりも強い通過抵抗を上糸24に与えるから、上糸24が第2挟持部73を逆流してカセット2内に引き戻されることはなく、前記のような糸掛けに必要な量の上糸24は糸駒62から確実に繰り出される。しかも、第1挟持部70から第2挟持部73間の上糸24に弛みが生じないため、その上糸24に糸よりにある糸の絡まり等が生じることもない。

【0104】図19、図20に示すように、上糸カセット2をカセット装着部3に装着完了した状態（即ち、受止め部109に係合部112が上方から係合した状態）においては、連動機構134により糸調子皿133が閉じ、糸通しスライダ作動部材119は上糸カセット2により最下位置に保持されたまま、糸通し軸31とスライダーガイド軸32が上方へ復帰して針穴19aに上糸24が通される。また、図20に示すように、操作ボタン94aが糸開放カム95で左方へ押動され、案内ピン89が糸保持板90から離隔して第2挟持部73が開放状態となり、上糸24が開放されて縫製可能状態となる。

【0105】しかも、上糸カセット57の装着が完了した状態において、1対の糸調子皿133が閉じ、第2挟持部73が開放状態になった場合でも、第1挟持部70で上糸24を挟持し、上糸24に通過抵抗を与えるようになっているため、上糸カセット57内の上糸24に糸よりによる糸の絡まり等が生じることはない。その結果、縫製中に糸の絡まりによる糸切れが生じにくくなる。このカセット装着部3に上糸カセット2を装着した状態において、糸案内部材106Aと天秤25の糸掛け部26が上糸カセット57内へ突出し、天秤25の糸掛け部26が上糸カセット2内をほぼ鉛直方向に往復移動可能となる。

【0106】ここで、図19に示すように、カセット本体60の糸調子器収容部57cにおいて、糸調子器の下流側に、下方に切欠き状に形成された糸案内部を含む上糸押え部材180（鎖線で図示）を設け、上糸カセット2のカセット装着部3への装着動作により糸調子器9からその下流側に延びた上糸24を下方に押下げ配置するようにしてもよい。この場合、上糸24の糸調子器9の軸部材への接触部分が増し上糸24が不意に外れたりしなくなるし、糸調子バネ135による上糸24の取り上げ量を多くすることができる。上糸カセット2を取り外す際には、上糸24を上糸押え部材180から簡単に解離することができる。

【0107】以上のように、上糸カセット57をカセット装着部3に装着した状態で、糸駒62から上糸24を

供給しながら縫製を行うことができる。上糸24の糸色を変更したり、上糸24を補充したりする為に、上糸カセット2をカセット装着部3から取外す際には、上糸カセット2の下端を指で上方へ押すことにより簡単に取外すことができる。

【0108】その取り外し後、上糸カセット2内には、天秤25と糸調子器9から外された弛み糸が残るので、操作ボタン94aを指で押して第2挟持部73を開放状態に切換え、その状態のまま上糸カセット2内の弛み糸を外部へ引き出し、カセット外周に巻き付けて上糸24の糸端部分を糸止め部104又は糸止め部104Aに仮止めする。その後、操作ボタン94を復帰させて第2挟持部73を閉じた状態にする。

【0109】図46、図47に示すように、前記開口部77、78は、上糸カセット2の外部の糸駒62Aから延びた上糸を第1案内69に導入する導入用開口部77、78でもあり、上糸カセット2内の糸駒62を取り外した状態で、上糸カセット2の外部の上糸24を使用して縫製する場合には、その糸駒62Aから延びた上糸24を導入用開口部77、78から第1案内69へ導き、糸経路59を通して糸出口68に導くことができる。例えば、図48に示すように、針として2本針19Aを適用する場合には、上糸カセット2内部の糸駒62の上糸24と、外部の糸駒62Aの上糸24とを糸経路59を通して糸出口68に導き、2本の上糸24を2本針19Aに供給することが可能となる。

【0110】本実施形態に係るミシン1と上糸カセット2は次の効果を奏する。

1) 上糸カセット2内に糸駒62を収容し、上糸カセット2を交換することで糸駒62を交換可能にしたので、上糸24の交換が簡単になった。特に、上糸カセット2の装着動作に連動して、天秤25の糸掛け部26と糸調子器9の糸調子皿133と糸調子バネ135とに自動的に糸掛けするので、糸掛けの操作が非常に簡単になり能率的に行うことができる。上糸カセット2の装着動作に連動して、自動糸通し機構10を作動させて針穴29aに自動的に糸通しするので、糸通しも非常に簡単になり、上糸24の交換を迅速に能率的に行うことができる。

【0111】特に、縫製を停止し、針棒18を針上位置に停止させると共に天秤25の糸掛け部26を糸締め側の位置に停止させた状態で、天秤25の位置を変えることなく、上糸カセット2を装着して天秤25の糸掛け部26と糸調子器9に糸掛けできるため、上糸カセット2の装着と糸掛けの操作が非常に簡単で能率的に行うことができる。しかも、上糸カセット2を上方から直線的に移動させることでカセット装着部3に装着でき、また、装着状態の上糸カセット2を上方へ直線的に移動させて取り外すことができるため、上糸カセット2の着脱操作が簡単で、上糸カセット2を迅速に交換できる。

【0112】また、上糸カセット2のカセットケース5

7が透明であり、内部の糸駒62の糸色を容易に識別できるため、上糸24の交換、或いは上糸カセット2の交換の際に便利である。上糸カセット2の内部の糸駒62を支持する支持壁63に凹部65を形成したので、この凹部65に指をかけて糸駒62の下端を押し、糸駒62を糸駒保持部58から簡単に取り外すことができる。

【0113】2) 上糸カセット2内に糸駒62をその軸心を縦向きにして保持し、その糸駒62から上方へ上糸24を繰り出し、糸経路59を通して糸出口68に導くように構成したので、上糸カセット2の左右方向幅を小さくすることができる。或いは、糸駒62の軸心と糸駒62からの上糸24の繰り出し方向を天秤25の糸掛け部26の往復移動方向とほぼ平行にして上糸カセット2をカセット装着部3に装着するように構成であるため、上糸カセット2の左右方向幅とカセット装着部3の左右方向幅を小さくすることができる。

【0114】このように、上糸カセット2は、左右方向幅の小さな縦長の直方体に近い小型のものであるので、天秤25の糸掛け部26の往復移動領域とその左側の部位に、つまりアーム頭部にカセット装着部3を配置することができた。その結果、天秤25の糸掛け部26の往復移動領域と重なる領域にカセット装着部3を形成することができスペース的に有利である。また、アーム部6の内部機構と干渉させずにカセット装着部3を極力後方に配置することができ、これにより上糸カセット2を装着した状態で上糸カセット2がアーム部6の前面から突出せず、アーム部6の外観も低下せず、アーム部6の前面のデザイン上の自由度も確保できる。

【0115】3) 上糸カセット2内の糸経路59の上流部に上糸24に常時通過抵抗を与える第1挟持部70を設け、上糸カセット24を装着した状態で、第1挟持部70と糸調子器9間の上糸24を緊張状態に維持するため、糸よりによる糸の絡まりの発生を防止でき、縫製中に糸の絡まりに起因する糸切れや糸のひきつりを防止できる。

【0116】そして、糸出口68の付近に第2挟持部73を設け、上糸カセット2の装着前や装着完了前には上糸24に通過抵抗を与えるようにし、第2挟持部73は第1挟持部70よりも強い通過抵抗を与えるため、上糸カセット2の取扱中に上糸24が勝手に繰り出されることもなく、また、上糸カセット2の装着時に天秤25の糸掛け部26と糸調子器9に糸掛けする際に、上糸を糸駒62から確実に繰り出すことができる。

【0117】そして、上糸カセット2を装着しない状態では、操作ボタン94aを指で操作して第2挟持部73を開放させ、上糸24を自由に繰り出すことができる。上糸カセット2の装着完了後には操作ボタン94aを上糸開放カム95で押圧して第2挟持部73を開放状態に切換えるため、縫製中には第2挟持部73の通過抵抗が上糸24に作用せず、上糸24の繰り出しが円滑

になる。上糸カセット2をカセット装着部3から取り外した際にカセットケース57外へ延びる上糸24をカセットケース57の外面に巻付けて、その糸端部分を糸止め部104,104Aに止めることができるので、非常に便利である。

【0118】4) 上糸カセット2の頂部に第1案内部69と、前後に細長い開口部77,78と、これに平行に臨む案内ピン75の糸案内部とを設けたため、上糸24が案内ピン75に沿って自由に移動でき、その上糸24を糸駒62から抵抗なく円弧を描くようにして円滑に繰り出すことができるうえ、上糸カセット2の外部に配置した糸駒からの上糸を開口部77,78から上糸カセット2内に導入し、その内部の糸経路59により糸出口68に導いて縫製に供することができる。そのため、針19の代わりに2本針を装着して2本の上糸で縫製する際に、上糸カセット2内の糸駒62と上糸カセット2外のアーム部6の頂部の糸駒保持部に保持した糸駒とから上糸を供給して縫製することができる。

【0119】5) 上糸カセット2の装着動作に連動して糸調子器9を開放状態にし、上糸カセット2の装着後には糸調子皿133を閉じる連動機構134を設けたため、前記のように上糸カセット2の装着動作に連動して糸調子器9に糸掛けすることができる。尚、カセット装着部3の下端側部分に糸調子器9を配置したので、上糸カセット2をカセット装着部3に上方から装着する装着動作と連動して糸調子器9に糸掛けするのに特に有利である。

【0120】6) 天秤機構8は特有の構造のものであり、上糸カセット2の装着動作に連動して糸掛け部26に糸掛けするのに好適のものである。即ち、天秤25の糸掛け部26の移動軌跡の全長に沿って延びる湾曲状の糸案内隙間108を形成する糸案内部材106Aを設け、糸案内隙間108の上端の導入口108aから上糸24を導入して糸掛け部26に糸掛け可能に構成してある。そのため、糸導入口108aは糸掛け部26の移動軌跡から後方へ後退しない位置にあるから、天秤25の糸掛け部26を前記の糸締め側の位置(針棒18の針上停止位置に対応する位置)に停止させたまま、上糸カセット2のカセット装着部3への装着動作と連動して糸掛け部26に糸掛けすることができる。

【0121】しかも、糸案内隙間108は、糸掛け部26の移動軌跡の全長にわたるものであり、糸案内部材106Aをなす1対の糸案内具106を天秤25のU形案内内部25aに相対摺動自在に挿通させてあるので、縫製時に天秤25が上下に往復移動しても、上糸24は糸案内具106で案内され、糸掛け部26から外れることはない。また、後側の糸案内具106の上端部を回動自在に枢支してあるため、天秤25のU形案内内部25aで1対の糸案内具106を案内できるから、1対の糸案内具106を線状部材のような加工し易い材料で安価に構成できるうえ、U形案内内部25aと1対の糸案内具106間に摺動抵抗が殆

ど作用しなくなり、摺動音も殆ど生じない。

【0122】7) 前記自動糸通し機構10において、針棒18が針上位置のうちの所定高さ範囲にある場合に限り、つまり、ストッパ123が図8の(イ)～(ロ)の適正範囲にある場合に限り、上糸カセット2の装着動作と連動する針穴19aへの自動糸通しが可能になっているため、針棒18の位置が不適切なまま、上糸カセット2を装着して針穴19aへの糸通しミスを起こすおそれがなく、操作の信頼性、操作性に優れる。しかも、針棒18が針上停止する位置に誤差が生じることに鑑み、糸通しスライダ40と、針棒18に設けた糸通し位置決め部材52との係合を介して、針棒18に対する自動糸通し機構10の高さ位置を合致させるように構成してあるため、針穴19aに確実に糸通しすることができる。

【0123】次に、前記実施形態を部分的に変更した変更形態について説明する。図49は、前記ミシン1の制御系の概要を示すものであり、制御ユニットには針上、針下検出センサ、主軸位相角検出センサ、その他図示外のセンサやスイッチ類からの信号が入力される。制御ユニットは、ミシン制御用の種々の制御プログラムに基づいて制御を行うコンピュータと複数の駆動対象機器の為に複数の駆動回路などを有する。この制御ユニットによりミシンモータ、針振り用ステッピングモータ、布送り用ステッピングモータ、などが駆動制御される。

【0124】前記針棒18が針上位置にある場合にのみ、カセット装着部3への上糸カセット2の装着を許可し、針棒18が針上位置以外の位置にある場合には上糸カセット2の装着を禁止する為に、カセット装着部3の上端付近にはカセット装着部3内へ出沒可能なストッパを設け、このストッパを出沒駆動する例えばソレノイドアクチュエータなどからなる電動アクチュエータを設け、針上、針下検出センサからの検出信号に基づいて制御ユニットにより電動アクチュエータを駆動制御し、針棒18が針上位置にある場合にのみストッパを退入位置に保持することで上糸カセット2の装着を許可し、針棒18が針上位置以外の位置にある場合にはストッパを進出位置に切換えて上糸カセット2の装着を禁止する構成とする。

【0125】次に、本発明の別実施形態について図面を参照して説明する。但し、前記実施形態と同じ部材には同一の符号を付して説明を適宜省略する。図50～52に示すように、別実施形態に係る電子制御式ミシン1Aにおいて、アーム部6の先端側部分のうちの天秤25の糸掛け部26が上下に往復移動する天秤移動領域とその近傍部の前面部には操作体装着部200が形成され、この体装着部200に着脱可能に装着される可動操作体としての糸掛け用操作体201と、糸調子器9と、抵抗付与部205と、糸掛け用操作体201の装着動作に連動して糸調子器9の糸調子皿133と抵抗付与部205を開閉させる連動機構202(図58参照)などが設けられている。

【0126】最初に糸経路について説明すると、図50～図52に示すように、アーム部6の基端側の頂部に横向きに保持された糸駒62Aから延びる上糸24は、順次、アーム部6の上面側部分に形成された左右方向向きの糸案内溝203、操作体装着部200、アーム部6の先端側の前面部に形成された縦向きの糸案内溝204を経由して針棒糸掛け147、糸ガイド36a、糸案内皿56に掛けられる。糸案内溝203にはその上流側から順に抵抗付与部205と糸調子器9が配設されている。操作体装着部200の中央部において上下に往復移動するように天秤25の糸掛け部26が配設されている。尚、糸調子器9のパネ力を調節する為の糸調子ダイヤル206も装備されている。

【0127】次に、糸掛け用操作体201について説明する。図50、図51、図54、図55、図57～図59に示すように、糸掛け用操作体201は、鉛直方向に細長い略直方体状のもので、操作体装着部200に対して少なくとも所定範囲内で移動可能である。糸掛け用操作体201は、上端から下端のやや上方まで連なる前壁部201cと、左側壁201aと、右側壁201bとを有する。左側壁201aの後端には左方へ折曲された被案内内部208が形成され、この被案内内部208が操作体装着部200のスリット200aで上下動可能に案内される。右側壁201bの後端には右方へ折曲された被案内内部208bが形成され、この被案内内部208bが操作体装着部200の案内溝200bで上下動可能に案内される。糸掛け用操作体201の前壁201cは、操作体装着部200の前側の案内壁部200cで上下動自在に案内可能に構成してある。

【0128】左側壁201aと右側壁201bの下端面は水平に形成され、右側壁201bの下端部は糸掛け用操作体201を操作体装着部200に挿入装着する際に、糸調子器9から天秤25に延びる上糸24を操作して糸掛け部26に糸掛けする上糸操作部である。糸掛け用操作体201の上端部には、前方にやや突出する突出部209が形成され、この突出部209に指をかけて糸掛け用操作体201を上方移動させ操作体装着部200から離脱可能になっている。

【0129】図50、図53～図55、図62に示すように、被案内内部208の下端部には、上糸24を針穴19aに糸通しする際に自動糸通し機構10を作動させる糸通し作動部としての作動部208aが形成されている。糸通しスライダ作動機構116において、レバー120には右端の上段部から前方にL字状に突出するレバー部120bが形成され、糸掛け用操作体201の装着動作の途中からレバー部120bを上方から押動駆動し、前記実施形態と同様の自動糸通し機構10を作動させる。

【0130】操作体装着部200の壁面には、操作体装着部200から離脱させた糸掛け用操作体201を図54に示す最上位置に保持する板パネ210がビス止めされている。尚、糸掛け用操作体201を操作体装着部200から取外し可能に構成してもよく、この場合には、天秤25の

糸掛け部26への糸掛けが簡単になる。操作体装着部200は、アーム部6の前面近傍部であって天秤移動領域の近傍部に、糸掛け用操作体201を鉛直に直線的な移動にて装着可能に形成され、糸掛け用操作体201を円滑に挿入装着できるように構成してある。

【0131】次に、糸掛け用操作体201の装着の動作を糸調子器9に連動させる連動機構202について説明する。図53～図62に示すように、連動機構202は、カム部211とカム従動部材212と作動板213とを有し、糸掛け用操作体201を操作体装着部200に装着する装着動作の途中において糸掛け用操作体201により糸調子器9の糸調子皿133と抵抗付与部205を開放させ且つ装着動作の完了時には糸調子皿133と抵抗付与部205を閉じるようになっている。即ち、図54に示すように、糸掛け用操作体201の右下半部には、上下方向に沿ってカム部211が形成され、このカム部211には下方から順に、傾斜部211a、平坦部211b、傾斜部211c、平坦部211dが形成されている。

【0132】ミシン機枠に枢支された支軸214には、カム従動部材212の下端部が回動自在に支持されている。このカム従動部材212は、2枚のレバー部215、216と、これらレバー部215、216を下端部に一体的に連結する連結部217と、カム従動ピン218などを有する。2枚のレバー部215、216は、適当間隔空けて平行に且つ側面視で約15度の位相角となるように配設され、レバー部215の一端即ち上端部には、カム従動ピン218が左方に突出するように付設され、このカム従動ピン218がカム部211に当接可能に構成されている。

【0133】図54、図58に示すように、糸調子器9には、レバー部216の上端部（カム従動部材の他端部）で押動駆動される作動板213が設けられ、この作動板213に押動駆動されて糸調子皿133が開放する。支軸214には、振りバネ219が外装され、図58においてカム従動部材212を反時計方向回りに付勢している。抵抗付与部205は、糸調子器9よりも上流側において上糸24に適度な通過抵抗を付与し、上糸24に糸により糸の絡まり等が発生するのを防止する為のものである。前記レバー部216の上端部は右方へ直角に折曲され、その水平板部220により、作動板213が糸調子皿133を開くのと同期して抵抗付与部205の押え板205aを押動駆動して押え板205aを開くようになっている（図60、図61参照）。水平板部220の非作動時には、押え板205aは抵抗付与バネ205bの付勢力により閉じた状態に保持されている。

【0134】次に、以上説明したミシン1Aの作用について説明する。図50～図52に示すように、糸駒62Aより引出した上糸24を操作者によって糸案内溝203に通し、糸掛け用操作体201を最上位置に移動させた状態において、上糸24を天秤25の糸掛け部26に掛け、糸案内溝204に通して針19の付近まで引き出し、

針棒糸掛け147、糸ガイド36a、糸案内皿56に掛ける（図5参照）。次に、糸端を一定長さに切断し、糸掛け用操作体201を操作体装着部200に直線的に押込み操作して、操作体装着部200に挿入装着していく。

【0135】この装着動作に伴い、先ず、カム従動ピン218がカム部211の傾斜部211aに当接して、糸調子皿133と押え板205aを開放してこれらに上糸24を糸掛けする。これと並行して、糸調子バネ135にも糸掛けされ、糸掛け用操作体201の右側壁201bの下端部の上糸操作部により、糸調子器9と天秤25の糸掛け部26間の上糸24が天秤25の両側の糸経路を長くするように下方へ押し下げられ、天秤25の糸取り量が確保される。

【0136】その後、平坦部211b、傾斜部211cがピン218に当接し、図62、図63に示す略装着完了状態において平坦部211dがピン218に当接すると、糸調子皿9と押え板205aが閉じる。一方、糸掛け用操作体201を操作体装着部200に挿入装着する途中から、前記実施形態と略同様に、糸掛け用操作体201の作動が伝達機構115を介して自動糸通し機構10に伝達され、この自動糸通し機構10により針穴10aへの糸通しが実行され縫製可能状態となる。このとき、作動部208aがレバー部120bを下方へ押動させるため糸掛け用操作体201の装着動作が伝達機構115に伝達される。

【0137】以上説明したミシン1Aと糸掛け用操作体201は、次の効果を奏する。

1) 前記上糸カセット2の代わりに、鉛直方向に細長い糸掛け用操作体201を採用しているため、糸掛け用操作体201と操作体装着部200の小型化を図ることができ、アーム部6の前面の外観への影響も少なくすることができる。

【0138】2) 連動機構202は、糸掛け用操作体201を操作体装着部200に装着する装着動作の途中において、その装着動作と連動して、糸掛け用操作体201により糸調子器9の糸調子皿133と抵抗付与部205の押え板205aを開放させ、その開放状態の糸調子器9と抵抗付与部205に上糸24を掛けることができる。そして、糸掛け用操作体201の装着動作の完了時には糸調子皿9と抵抗付与部205を閉じさせることができる。この糸掛けと並行的に、糸掛け用操作体201を操作体装着部200に装着する装着動作と連動して、自動的に糸通しを行うこともできる。

【0139】こうして、糸掛け用操作体201の装着に連動して上糸24を糸調子器9と抵抗付与部205に糸掛けすることができると共に自動糸通しを行うことができるため、上糸24の補給や交換時の糸掛け操作と糸通し操作が簡単化し、上糸交換の作業効率が高まる。

【0140】3) 連動機構202は、糸掛け用操作体201に形成されたカム部211と、一端がカム部211に当接可能で且つ長さ方向途中部が回動自在に支持されたカム従動部材212と、このカム従動部材212の他端部で押動駆

動されて糸調子器 9 を開放させる作動板 213 とを有するため、糸調子器 9 としては一般的な構成の安価な糸調子器 9 を採用可能となる。

【0141】尚、前記糸掛け用操作体 201 は、マシン 1 A のアーム部 6 に直接連結しておらず、アーム部 6 から取り外し可能な構成であったが、糸掛け用操作体 201 をアーム部 6 に平行リンク、その他のリンク機構や揺動リンク部材を介して連結した構成にしてもよい。

【0142】

【発明の効果】 請求項 1 の発明によれば、アーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、この可動操作体の前記所定範囲内で移動させることにより、上糸を天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、可動操作体の移動に連動させて、天秤の糸掛け部に糸掛けし且つ上糸を針穴に糸通しすることができるため、天秤の糸掛け部への糸掛け作業や針穴への糸通し作業を簡単化し、作業能率を高めることができる。

【0143】請求項 2 の発明によれば、上糸を天秤の糸掛け部に糸掛けする際に上糸操作部により上糸を操作して糸掛けすることができるうえ、上糸を針穴に糸通しする際に糸通し作動部により自動糸通し機構を作動させて糸通しを行うことができる。その他請求項 1 と同様の効果を奏する。

【0144】請求項 3 の発明によれば、前記マシンのアーム部の前部又は前面部に可動操作体を着脱可能に装着する為の操作体を形成したため、可動操作体の着脱操作を行いやすくなるうえ、アーム部の前面部に位置している天秤の糸掛け部や糸調子器に上糸を掛ける面でも有利である。その他請求項 1 又は 2 の発明と同様の効果を奏する。

【0145】請求項 4 の発明によれば、可動操作体は糸駒を收容しかつその糸駒から繰り出された上糸を天秤側へ供給する上糸カセットであるので、上糸カセットから上糸を供給可能である。この上糸カセットはアーム部に着脱可能なものであり、上糸カセットを装着側へ操作するだけで、天秤の糸掛け部への糸掛けと針穴への糸通しを簡単に行うことができ、上糸カセットを介して上糸の交換も簡単に行うことができる。その他請求項 1～3 の何れかと同様の効果を奏する。

【0146】請求項 5 の発明によれば、マシンのアーム部の前面部に、前記操作体装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したので、上糸カセットを装着する際には、カセット装着に上糸カセットを装着側から装着して直線的に移動させるという簡単な操作で装着できるし、上糸カセットを取り外す際に直線的に移動させることで取り外すことができる。その他請求項 4 と同

様の効果を奏する。

【0147】請求項 6 の発明によれば、カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設け、カセット装着部の他の一部に突出する糸調子器を設け、上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、天秤と糸調子器への糸掛けと、針穴への糸通しを簡単に能率的に行うことができる。その他請求項 5 と同様の効果を奏する。

【0148】請求項 7 の発明によれば、カセット装着部に突出するように糸調子皿と糸調子バネとを含む糸調子器を設け、上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに自動的に糸掛けすることができ、自動糸通し機構を介して上糸を針穴に自動的に糸通しすることができ、上糸交換時の糸掛けと糸通しの作業能率を高めることができる。その他請求項 6 と同様の効果を奏する。

【0149】請求項 8 の発明によれば、上糸カセットを上糸カセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したので、上糸カセットを上糸カセット装着部に途中の位置まで装着して、上糸カセットから手を離し得る状態になった状態で、自動糸通し機構に手動にて上糸を掛けることができ、その後の上糸カセットの装着動作により自動糸通し機構を作動させて糸通しを行うことができる。請求項 5～8 の何れかと同様の効果を奏する。

【0150】請求項 9 の発明によれば、可動操作体の作動を自動糸通し機構に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられているため、停止状態の針棒の高さ位置に合わせて係合機構を解除作動させることができるから、針棒の高さ位置に応じて針穴の高さ位置がずれていても、確実に糸通しを行ってから解除作動させることができる。請求項 1～8 の何れかと同様の効果を奏する。

【0151】請求項 10 の発明によれば、少なくとも針棒の作動位置を検出する検出手段を設け、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、可動操作体を移動可能に構成したので、針棒が所定位置にあって針穴の高さ位置が一定の高さ位置にある場合だけ、可動操作体を移動させて自動糸通し機構を作動させ、糸通しを円滑に行うことができ、針棒の高さ位置のズレに起因する糸通しミスを防止し、自動糸通し機構の破損を確実に防止することができる。その他請求項 1～9 の何れかと同様の効果を奏する。

【図面の簡単な説明】

【図 1】本発明の実施形態の電子制御式ミシンと上糸カセットの正面図である。

【図 2】上糸カセットを取外した状態のミシンの平面図である。

【図 3】カセット装着部付近の内部構造を示す縦断面図である。

【図 4】カセット装着部付近の内部構造等を示す平面断面図である。

【図 5】針棒上下動機構と自動糸通し機構などの正面図である。

【図 6】糸通し直前状態を示す図 5 相当図である。

【図 7】針棒とストッパーとの関係を示す図 5 相当図である。

【図 8】針棒の適正高さ範囲を説明する図 5 相当図である。

【図 9】(a) は糸通しフックによる糸通し直前状態を示す斜視図、(b) は糸通し直後状態を示す斜視図、

(c) は糸通し後に糸通しフックが上昇した状態の要部断面図である。

【図 10】糸通しスライダ作動機構と上糸カセットなどの縦断側面図である。

【図 11】天秤機構とカセット装着部を示す要部縦断側面図である。

【図 12】天秤の糸掛け部の移動範囲を示す要部縦断側面図である。

【図 13】糸掛け部への糸掛け可能範囲を示す図 12 相当図である。

【図 14】上糸カセット（装着直前状態）とカセット装着部の正面図である。

【図 15】上糸カセット（装着途中状態）とカセット装着部の正面図である。

【図 16】上糸カセット（装着途中状態）とカセット装着部などの縦断側面図である。

【図 17】上糸カセット（装着完了直前状態）とアーム頭部の正面図である。

【図 18】第 2 挟持部とカムの部分拡大断面図である。

【図 19】上糸カセット（装着完了状態）とアーム頭部の正面図である。

【図 20】第 2 挟持部（開放状態）とカムを示す図 18 相当図である。

【図 21】カセット装着部に装着された上糸カセットの横断面図である。

【図 22】上糸カセット（装着完了状態）とカセット装着部などの縦断側面図である。

【図 23】上糸カセット（開閉蓋開状態）の正面図である。

【図 24】上糸カセットの縦断側面図である。

【図 25】上糸カセットの平面図である。

【図 26】上糸カセットの底面図である。

【図 27】糸経路の下流側部分を示す上糸カセットの部分切欠き横断平面図である。

【図 28】カセット本体と糸駒（装着前状態）の縦断側面図である。

【図 29】カセット本体と糸駒（装着後状態）の縦断側面図である。

【図 30】上糸カセット（開閉蓋開状態）の正面図である。

【図 31】上糸カセット（開閉蓋開状態）の底面図である。

【図 32】第 1 案内内部を示すカセット本体の平面図である。

【図 33】第 2、第 3 案内内部と第 2 挟持部を示す上糸カセットの底面図である。

【図 34】第 2、第 3 案内内部と第 2 挟持部を示すカセット本体の横断面図である。

【図 35】糸止めの手順を説明する上糸カセットの正面図である。

【図 36】糸止め部等を示す上糸カセットの側面図である。

【図 37】押え上げレバーと糸調子器と連動機構などの正面図である。

【図 38】押え上げレバーと糸調子器と連動機構などの側面図である。

【図 39】押え上げレバーと糸調子器と連動機構などの平面図である。

【図 40】上糸カセット装着時の状態を示す図 37 相当図である。

【図 41】上糸カセット装着時の状態を示す図 38 相当図である。

【図 42】上糸カセット装着途中の状態を示す図 39 相当図である。

【図 43】上糸カセット装着完了状態を示す図 39 相当図である。

【図 44】上糸カセット装着完了状態を示す図 37 相当図である。

【図 45】上糸カセット装着完了状態を示す図 38 相当図である。

【図 46】上糸カセットの外部の上糸を使用して縫製する場合のミシンの正面図である。

【図 47】上糸カセットの外部の上糸を使用して縫製する場合のミシンの平面図である。

【図 48】2 本針を適用した場合のミシンの正面図である。

【図 49】ミシンの制御系の概略ブロック図である。

【図 50】別実施形態の電子制御式ミシンと糸掛け用操作体の正面図である。

【図 51】ミシン及び糸掛け用操作体の側面図である。

【図 52】ミシンの平面図である。

【図 53】操作体装着部付近の内部構造要部を示す部分

切欠き横断面図である。

【図 5 4】操作体装着部付近と糸掛け用操作体の縦断面図である。

【図 5 5】糸掛け用操作体の装着完了状態を示す要部横断面図である。

【図 5 6】操作体装着部の下端部付近の要部横断面図である。

【図 5 7】天秤機構と糸掛け部と糸掛け用操作体の関係を示す縦断面図である。

【図 5 8】連動機構と糸調子器との関係を示す縦断面図である。

【図 5 9】連動機構と抵抗付与部との関係を示す縦断面図である。

【図 6 0】抵抗付与部（閉状態）の拡大断面図である。

【図 6 1】抵抗付与部（開放状態）の拡大断面図である。

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【図 6 2】操作体装着部付近と糸掛け用操作体（装着完了状態）の図 5 4 相当図である。

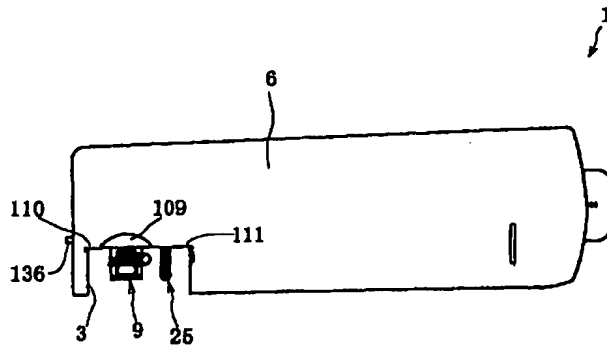
【図 6 3】操作体装着部付近と糸掛け用操作体（装着完了状態）の図 5 7 相当図である。

【符号の説明】

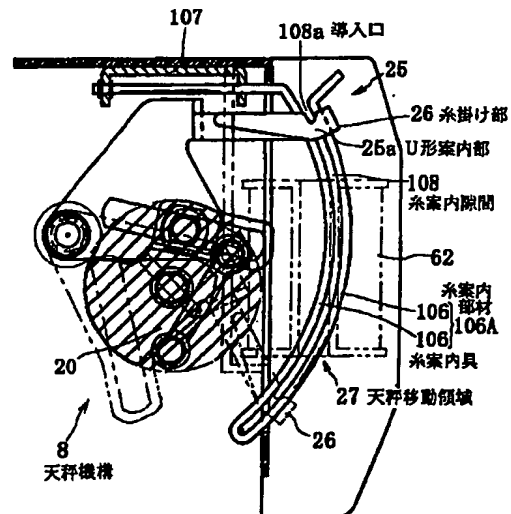
- | | |
|--------|---------|
| 1, 1 A | ミシン |
| 2 | 上糸カセット |
| 3 | カセット装着部 |
| 6 | アーム部 |
| 8 | 天秤機構 |
| 9 | 糸調子器 |
| 10 | 糸通し機構 |
| 24 | 上糸 |
| 25 | 天秤 |
| 25 a | U形案内内部 |

- | | |
|-------|-----------|
| 26 | 糸掛け部 |
| 27 | 天秤移動領域 |
| 57 | カセットケース |
| 58 | 糸駒保持部 |
| 59 | 糸経路 |
| 62 | 糸駒 |
| 65 | 凹部 |
| 68 | 糸出口 |
| 69 | 第1案内部 |
| 70 | 第1挟持部 |
| 71 | 第2案内部 |
| 72 | 第3案内部 |
| 73 | 第2挟持部 |
| 80 | 押え板 |
| 81 | 板バネ |
| 82 | 糸より発生防止機構 |
| 84 | 案内ピン |
| 90 | 糸保持板 |
| 91 | 板バネ部材 |
| 104 A | 糸止め部 |
| 106 | 糸案内具 |
| 106 A | 糸案内内部材 |
| 108 | 糸案内隙間 |
| 108 a | 導入口 |
| 133 | 糸調子皿 |
| 135 | 糸調子バネ |
| 200 | 操作体装着部 |
| 201 | 糸掛け用操作体 |
| 207 | 上糸操作部 |
| 208 a | 糸通し作動部 |

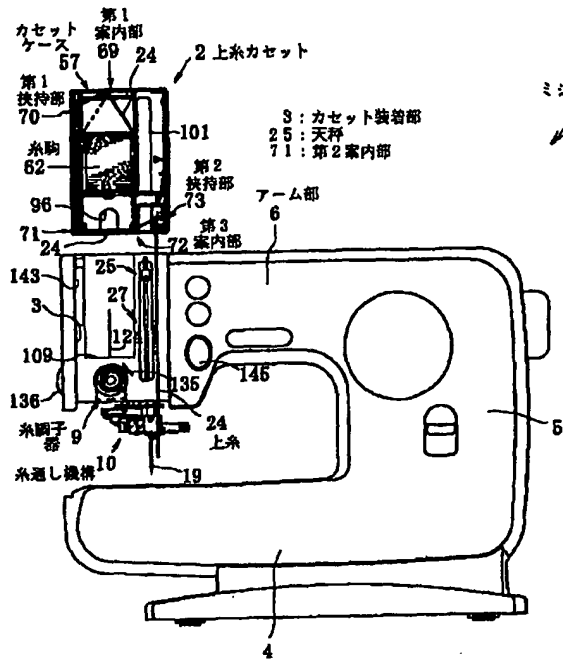
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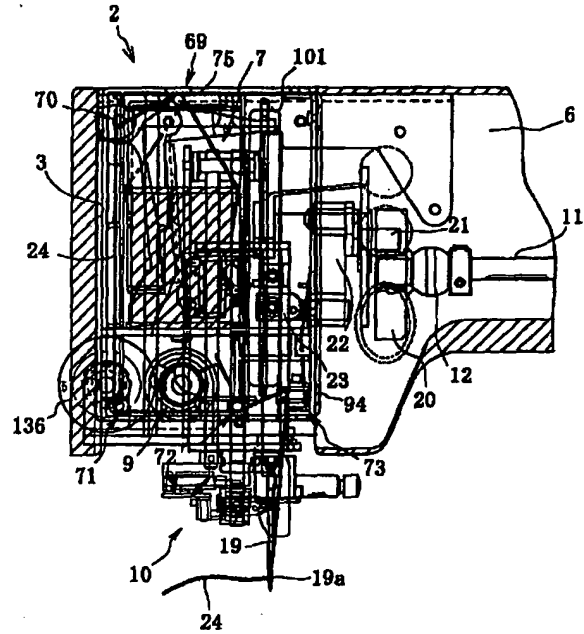
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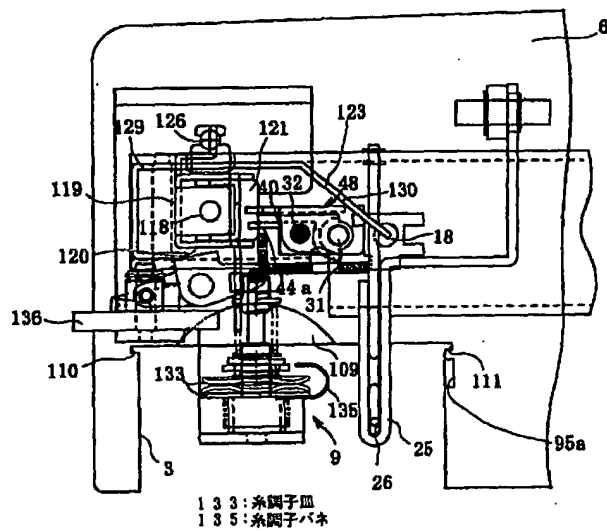
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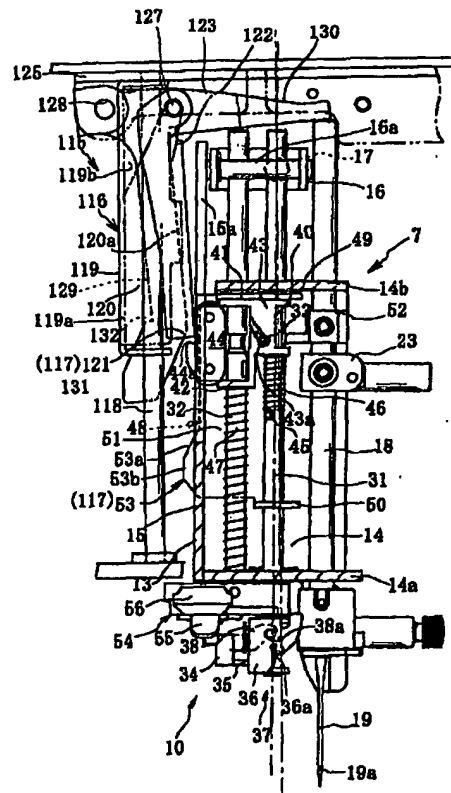
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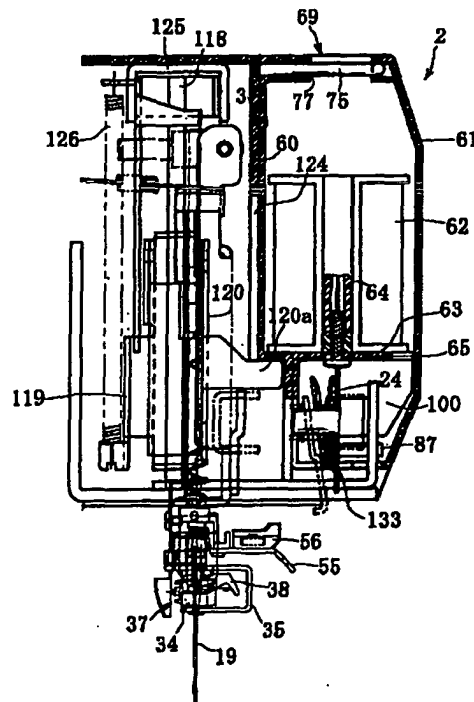
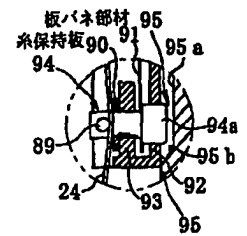
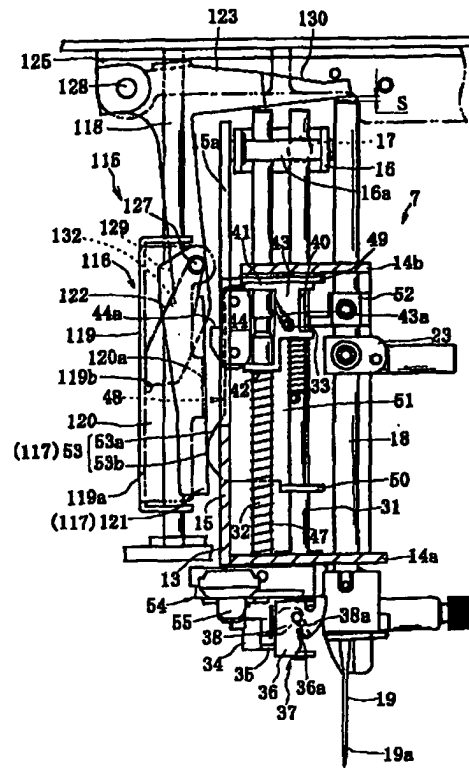
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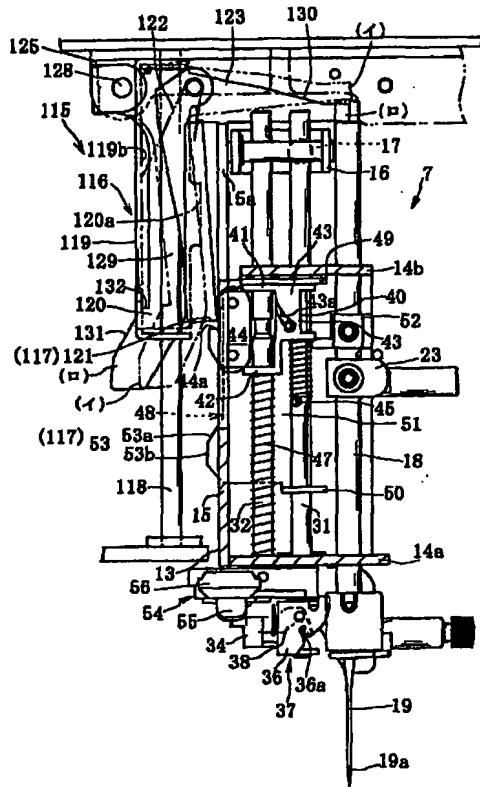
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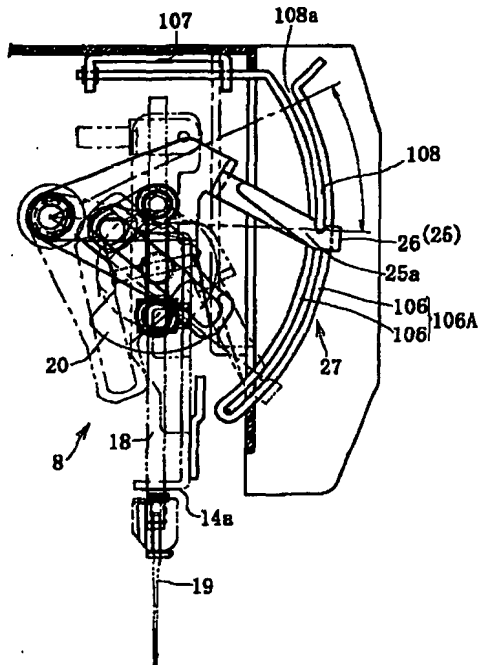
【図 18】



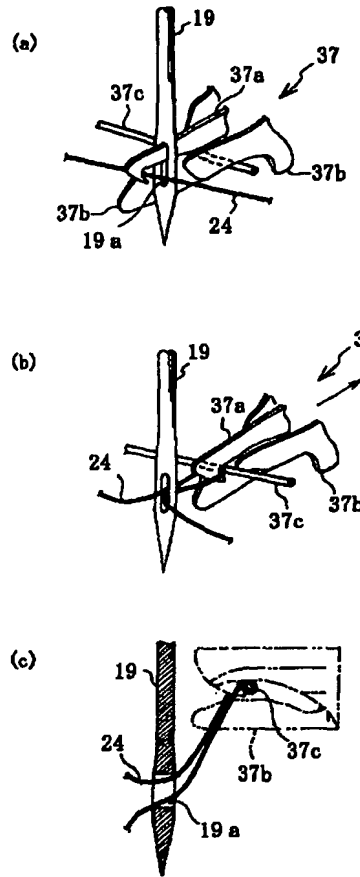
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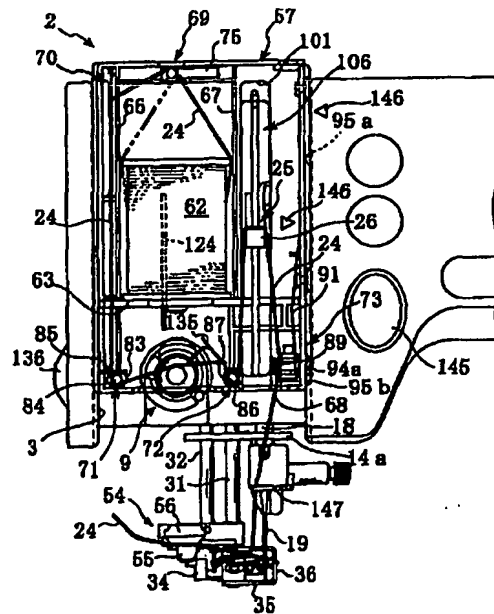
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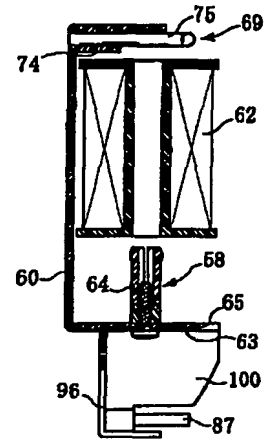
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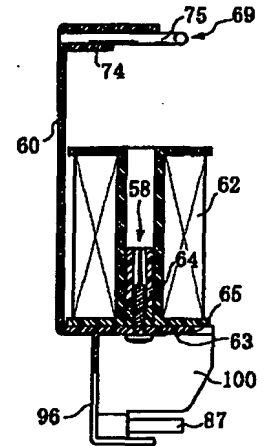
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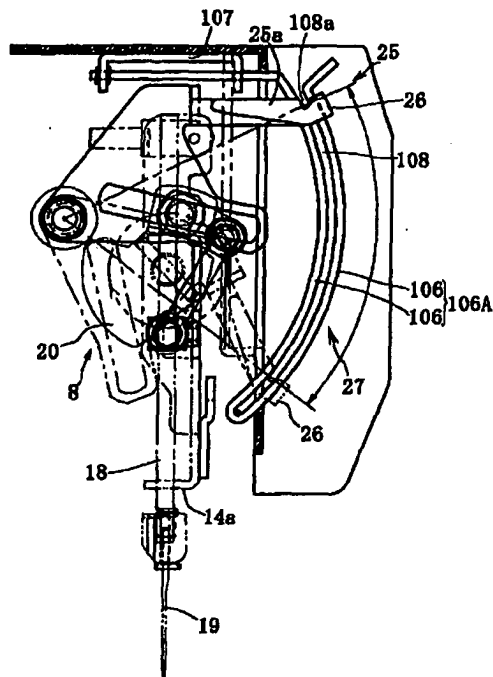
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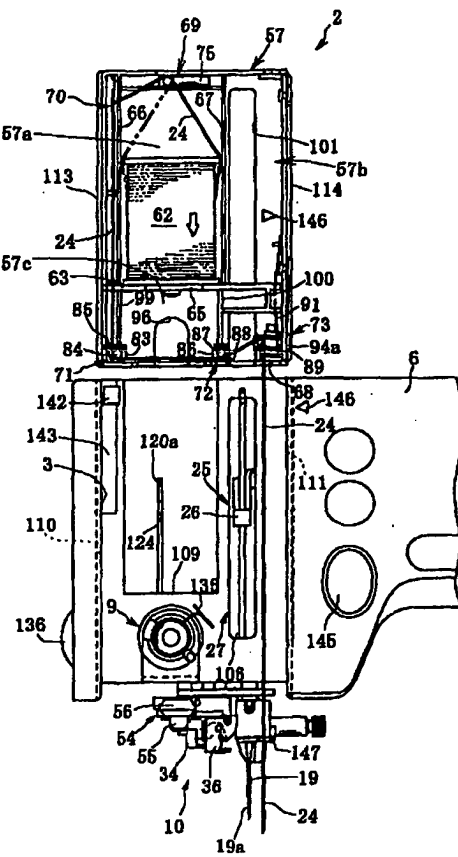
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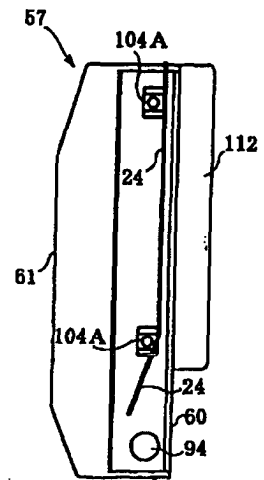
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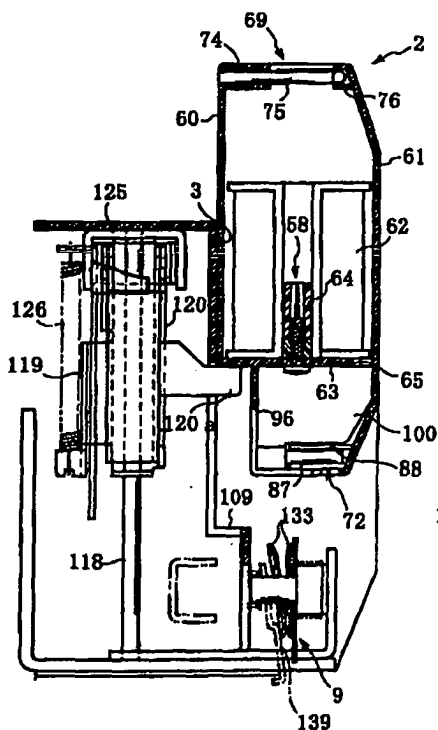
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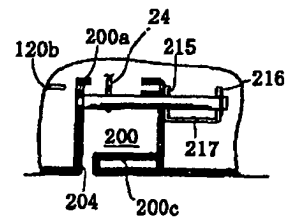
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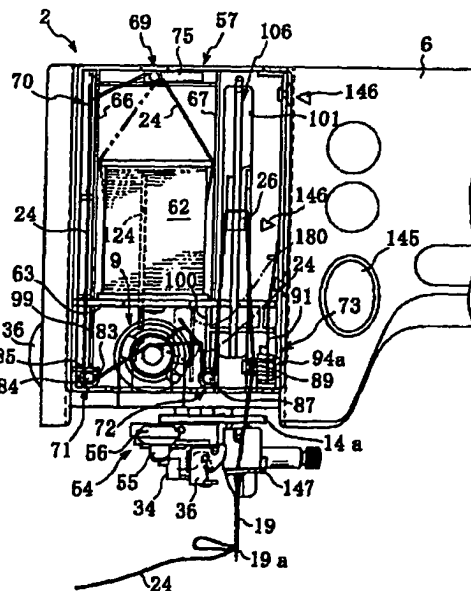
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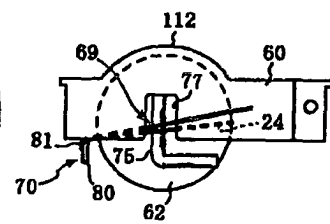
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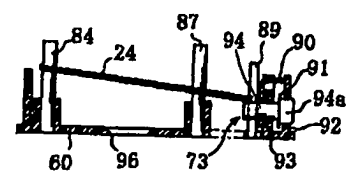
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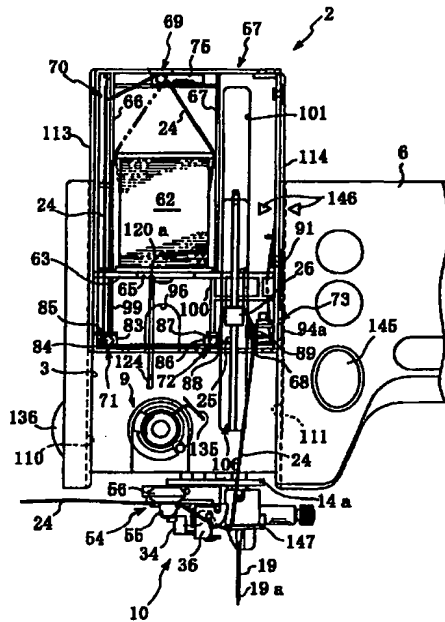
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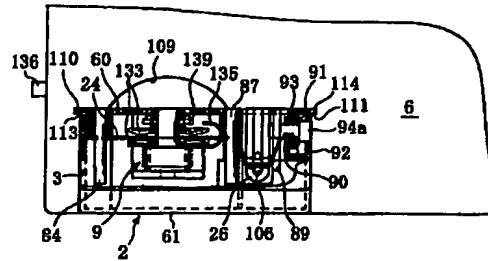
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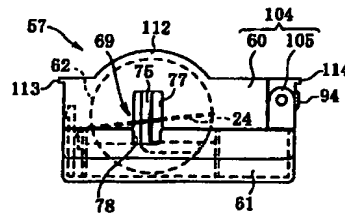
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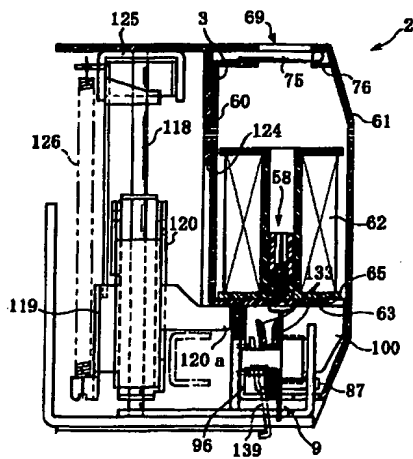
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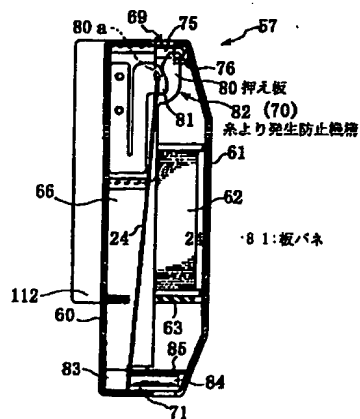
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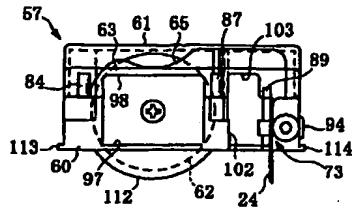
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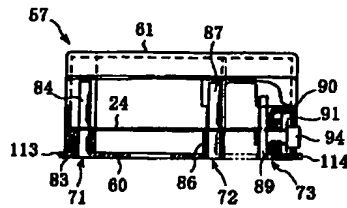
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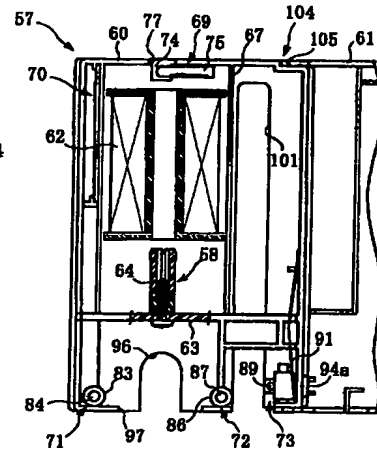
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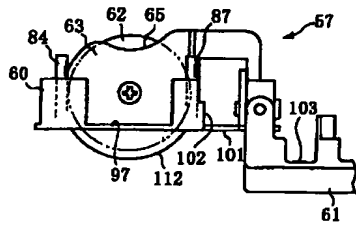
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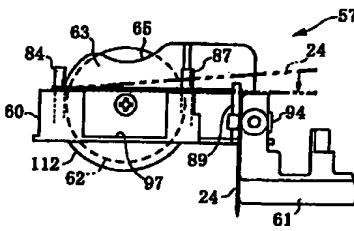
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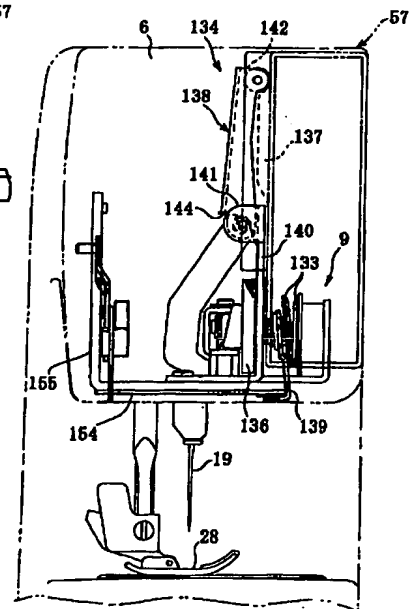
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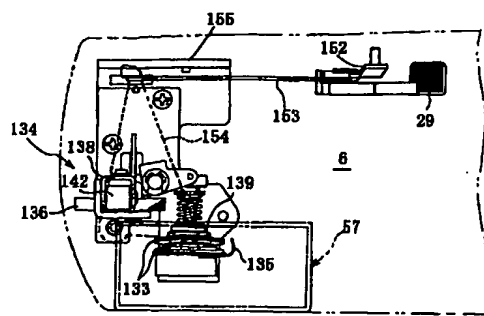
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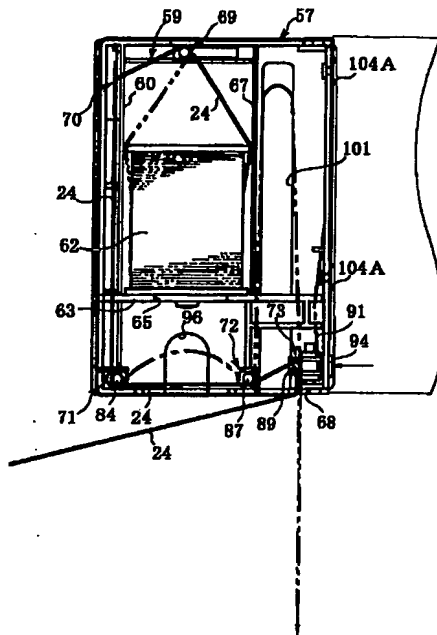
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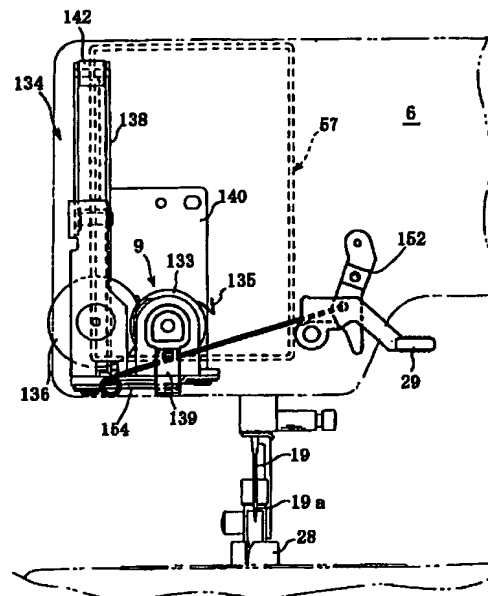
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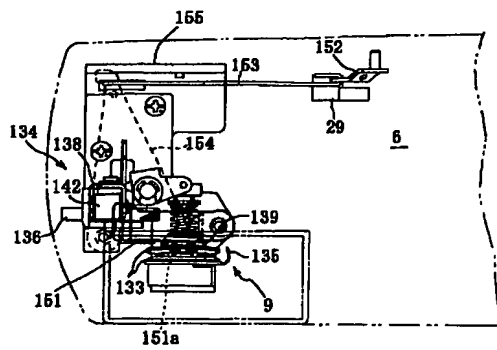
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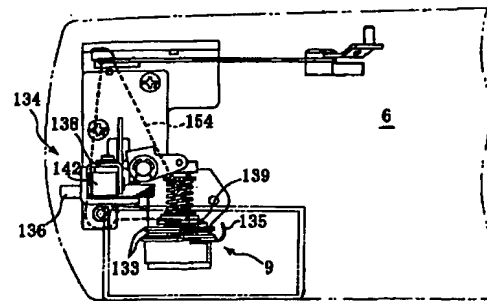
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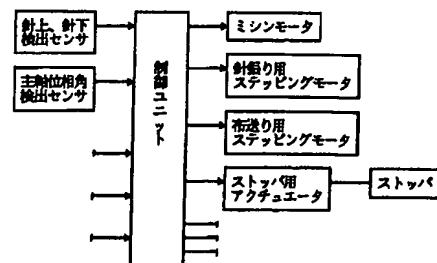
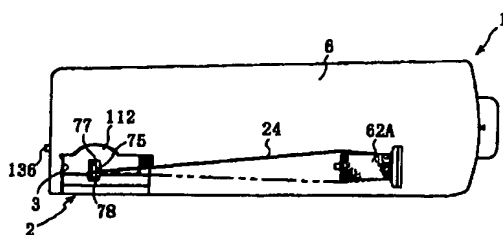
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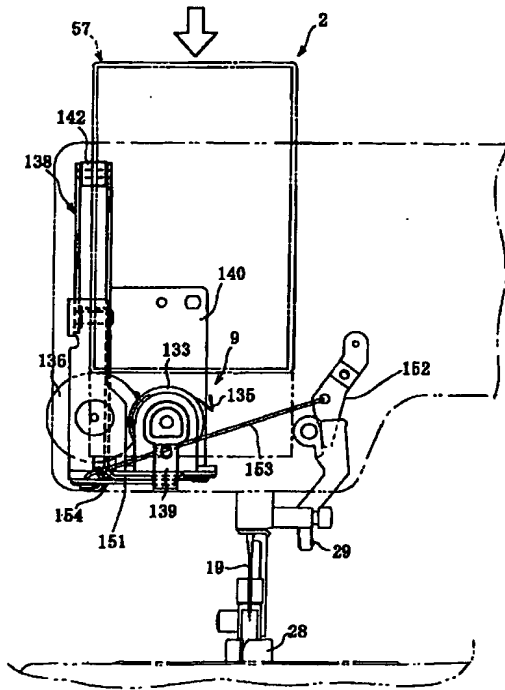
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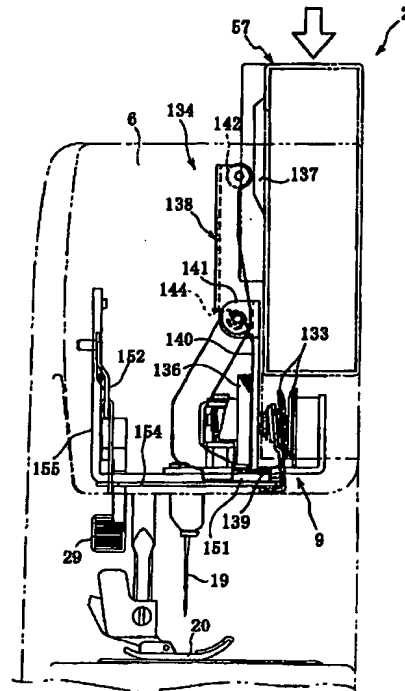
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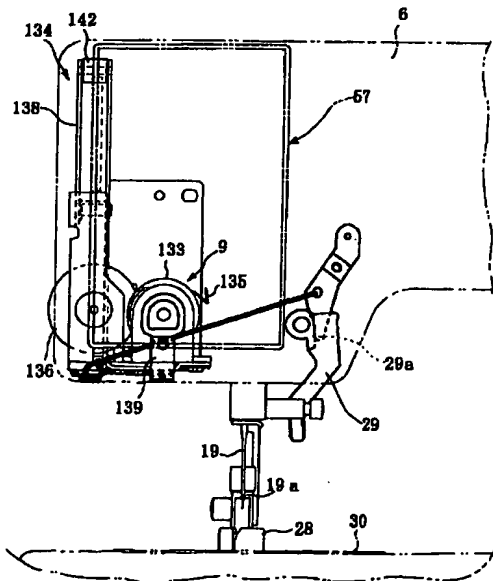
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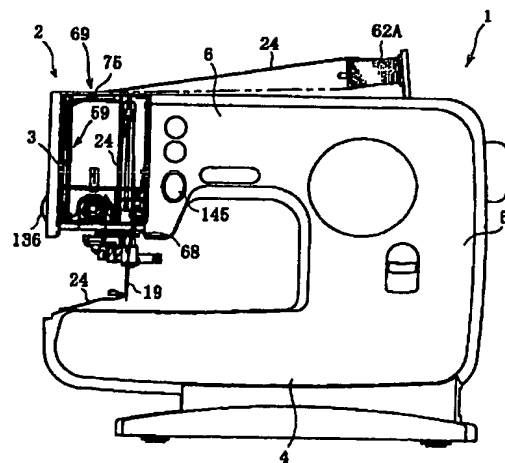
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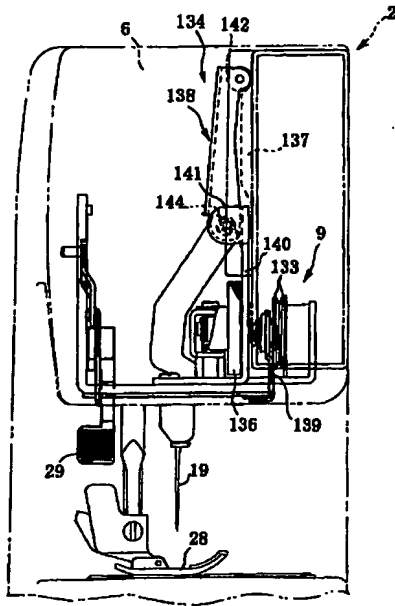
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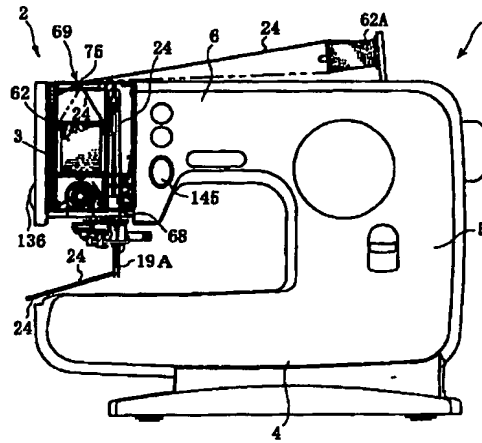
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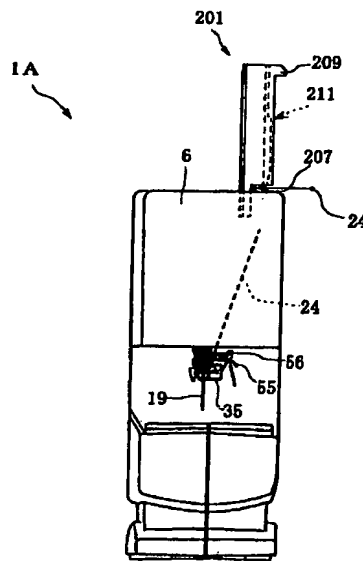
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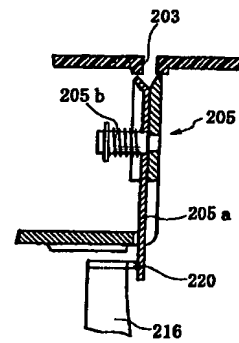
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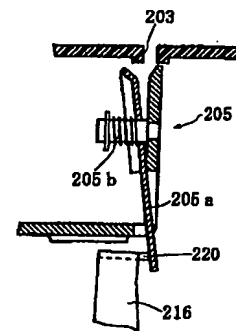
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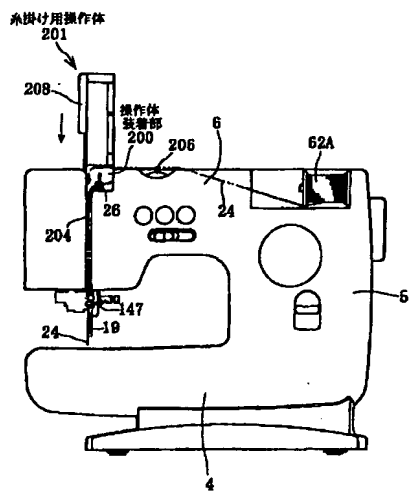
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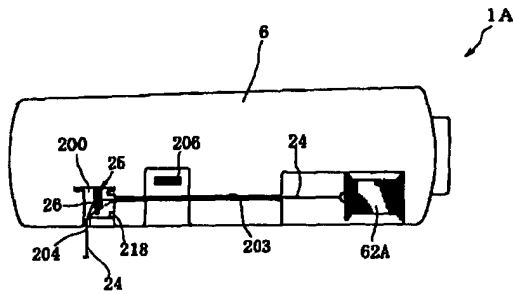
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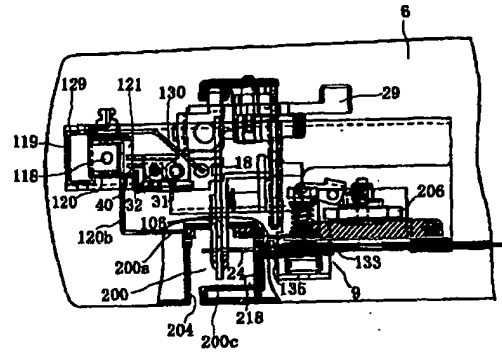
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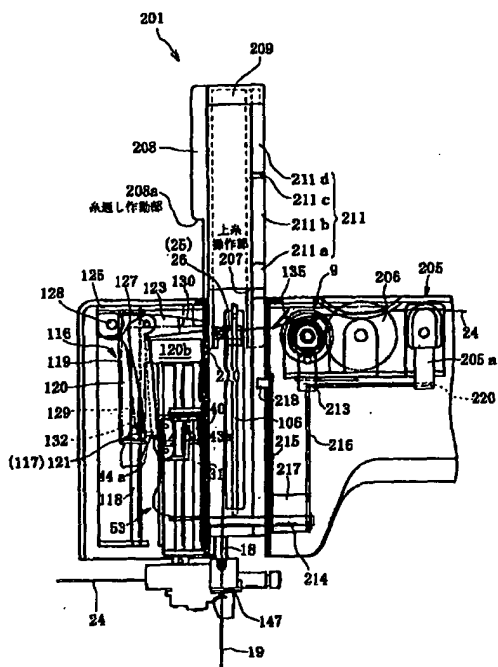
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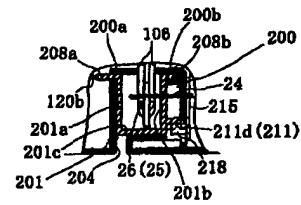
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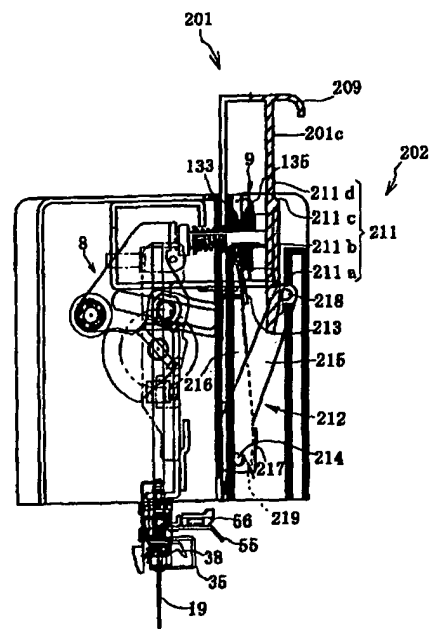
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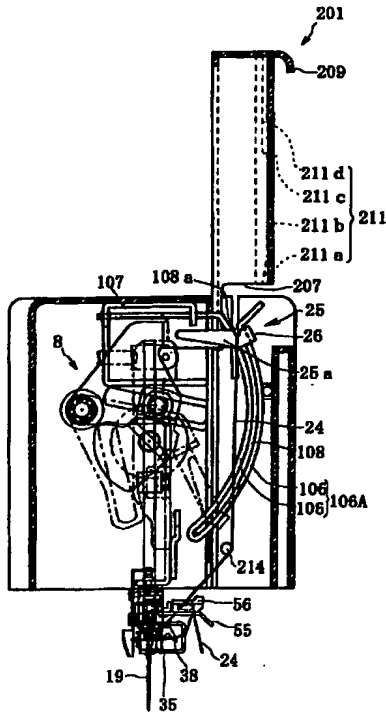
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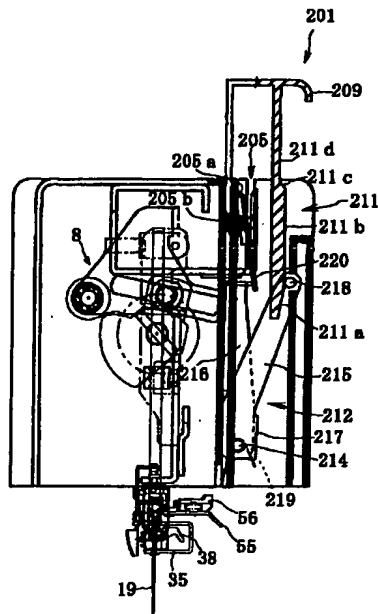
【図58】



【図57】



【図59】



【図63】

【図62】

